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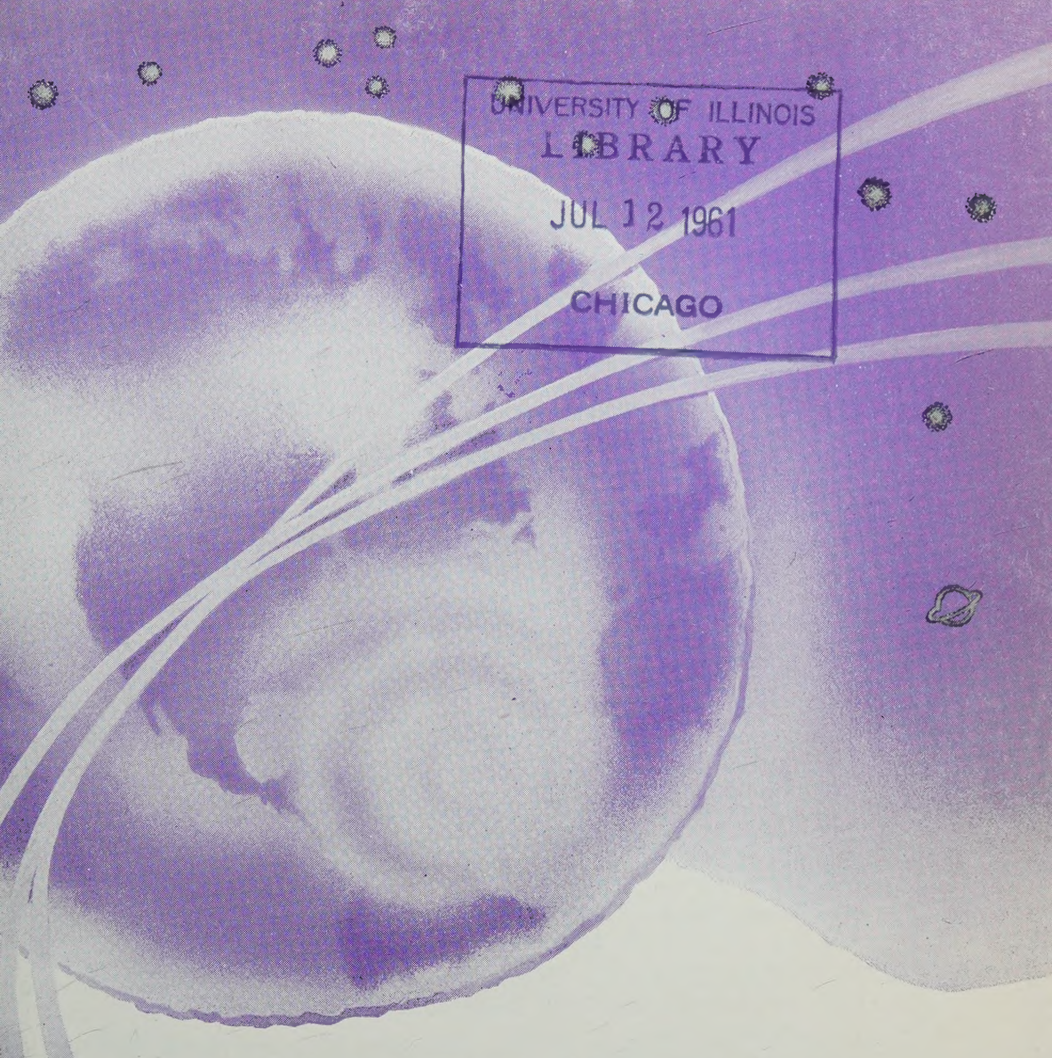

# Meteorological & Geoastrophysical ABSTRACTS

Vol. 12 MARCH 1961 No. 3

# METEOROLOGICAL AND GEOASTROPHYSICAL ABSTRACTS

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# METEOROLOGICAL AND GEOASTROPHYSICAL ABSTRACTS

MALCOLM RIGBY, Editor

Vol. 12 March 1961 No. 3

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**Special Feature in This Issue**

Annotated Bibliography on Limnology
By
Andrew J. Meglis

*(For table of contents see back cover)*

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# FOREWORD

Meteorological and Geoastrophysical Abstracts is a monthly publication devoted to current literature in meteorology, geophysics and astrophysics.

Part I contains abstracts of current literature in the fields of meteorology, etc.

Part II of each issue comprises an annotated bibliography of important references on a special subject. Bibliographies published in the successive issues were:

### Vol. I, 1950

1. **Atmos. Pollution**
2. **Aerobiology**
3. **Cloud Physics**
4. **Hail**
5. **Tornadoes**
6. **Volcanic Dust**
7. **Climat. Changes**
8. **Thunderstorms**
9. **Icing**
10. **Acoust. Propagation**
11. **Evaporation**

### Vol. II, 1951

1. **Extended Forecast.**
2. **Long Range Forecast.**
3. **Soil Temp.**
4. **Constants, etc.**
5. **Clim. of Near East**
6. **Clim. of Middle East**
7. **Special Winds**
8. **Radar Storm Detect.**
9. **Condensation Trails**
10. **Clim. of N. E. Africa**
11. **Mountain Met.**

### Vol. III, 1952

1. **Clim. of N. W. Africa**
2. **Carbon Dioxide**
3. **Clim. of Argentina, etc.**
4. **Dew**
5. **Objective Forecast.**
6. **Stratus Forecast.**
7. **Urban Climatology**
8. **Clim. of C. Africa**
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10. **Glaze and Rime**
11. **Free Air Turbulence**

### Vol. IV, 1953

1. **Turbulence Theory**
2. **Turbulent Diffusion**
3. **Frost**
4. **Clim. of Australia, etc.**
5. **High Level Winds**
6. **Winds in Stratosphere**
7. **Jet Stream**
8. **Radiation Bioclim.**
9. **Clim. of Pacific**
10. **Auroras**
11. **Sferics**

### Vol. V. 1954

1. **Oceanog. Met.**
2. **Clim. of S. E. Asia**
3. **Auroral Physics**
4. **Tropopause**
5. **Balloons**
6. **Numerical Forecast.**
7. **Radiation Data**
8. **Vertical Motion**
9. **Clim. of Arctic**
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11. **Wind Waves and Swell**

### Vol. VI, 1955

1. **Bibliog. of Bibliog.**
2. **Texts & Monogr. Bibliogs.**
3. **Storm Surges**
4. **Ionospheric Prop.**
5. **Photochem.—Upper Atmos.**
6. **Cloud Physics**
7. **Radar Cloud Physics**

8–9. **Atmos. Nuclei**

10. **Weather Modification**
11. **Cooling Power**

### Vol. VII, 1956

1. **Synoptic Met.-Arctic**
2. **Clim. of Enclosed Spaces**
3. **Cosmic Rays (–1952)**
4. **Cosmic Rays (1953–56)**
5. **Atmos. Radioactivity**
6. **Inversions**
7. **Snow Micromet.**
8. **Snow Micromet. (Suppl.)**

9–11. **Tropical Cyclones**

### Vol. VIII, 1957

1. **Solar Weather Relations**
2. **Night Airglow**
3. **Forecasting Special Elements**
4. **Forest Micrometeorology**
5. **Hydromet. Forecasting**
6. **Numerical Forecast. (Suppl.)**
7. **Albedo**
8. **Meteors**

9–10. **Tropospheric Prop.**

11. **Medical Meteorology**

### Vol. IX, 1958

1. **Radioastronomy**
2. **Solar Astrophysics**
3. **Radioactivity in Atmosphere**
4. **Waves and Currents**
5. **Physical Oceanog.**
6. **Dynamic & Phys. Oceanog.**
7. **Long Range Forecast.**
8. **Radar Met.**
9. **Cosmic Rays**

10–11. **Geomagnetism**

### Vol. X, 1959

1. **Works of C. E. P. Brooks**
2. **Tornado Forecasting**
3. **Soil Moisture**
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7. **Acoustic Waves**
8. **Evaporation Measurement**
9. **Evapotranspiration (–1955)**
10. **Evapotranspiration (1956–1959)**
11. **Evaporation**

### Vol. XI, 1960

1. **Outstanding Reference Works**
2. **Outstanding Texts**
3. **Numerical Forecast. (Suppl.)**
4. **Ionospheric Physics**
5. **Ionospheric Propagation**
6. **Ionosphere**
7. **Forecast Verification**
8. **Radar Meteorology**
9. **Rocket Meteorology**
10. **Satellite Meteorology**
11. **Airglow**

Bibliographies in preparation or published in Vol. XII

*Aurora* (No. 1)
*Limnology* (No. 3)
*Physics of Lightning*
*Auroral Physics* (No. 2)
*Upper Atmosphere Structure* (No. 4, 5 and 6)
*Precipitation Chemistry*

Part III contains a listing of reviews, translations, reprints, and the contents of important publications. These are published in the earliest issue where space permits.

Part IV is made up of author, subject and geographical indexes.

# EXPLANATIONS

**Location of material:** For each entry, a symbol is given for at least one library where the material may be found. The Union List of Serials (Gregory) is the source of most of the symbols used. In some cases, where no symbol has been assigned to a library, one will be devised according to the principles of the Union List.

**Library symbols** used frequently may be found in the following list:

| | |
|---|---|
| **DA:** | U. S. Dept. of Agriculture Library, Washington, D. C. |
| **DBS:** | U. S. Bureau of Standards Library, Washington, D. C. |
| **DGS:** | U. S. Geological Survey Library, Washington, D. C. |
| **DLC:** | Library of Congress, Washington, D. C. |
| **DN-HO:** | U. S. Navy Hydrographic Office Library, Suitland, Md. |
| **DNLM:** | U. S. National Library of Medicine, Washington, D. C. |
| **DSI:** | Smithsonian Institution, Washington, D. C. |
| **DWB:** | U. S. Weather Bureau Library, Washington, D. C. |

**Other symbols:**

| | |
|---|---|
| * | before an entry indicates a good data source. |
| † | before an entry indicates a good bibliography. |
| § | before an entry indicates a synoptic case history study accompanied by charts. |
| Ⓢ | after an abstract indicates an abstract prepared for NASA. |

**Geographic locations** are in the English form rather than the form used locally, for example, Moscow for Moskva.

**Titles of articles or monographs** are in the language of the original article unless otherwise stated. Slavic (Cyrillic) titles are transliterated into the Roman alphabet using a modification of the Library of Congress transliteration scheme.

**Abbreviations:**

*Titles of periodicals* are not abbreviated, as a rule.

The months of the year from March to July are not abbreviated. Other months are abbreviated as Jan., Feb., Aug., Sept., Oct., Nov., and Dec.

The word or abbreviation for Volume (Tom, Band, Jahrgang, Año, etc.), for Number (Heft, Fascicule, Vypusk, etc.) and for page or pages is omitted from most entries. Thus an entry will read as follows:

*Meteorologische Rundschau*, 2(5/6):146–151, May/June 1950.

This indicates that the article appeared in *Meteorologische Rundschau*, *Jahrgang* 2 (Vol. 2), *Heft* 5/6 (No. 5/6), *pages* 146–151, May/June 1950.

# PART I. ABSTRACTS OF CURRENT METEOROLOGICAL MATERIAL

## A. GENERAL

### A1. COLLECTED WORKS

*See also:* **Groundwater research, 12.3–210.**

12.3–1 551.5:62 551.556:624.2 551.579:62

†Biggs, J. M.; Vincent, G. S. et al. **Topics in engineering meteorology.** *Meteorological Monographs*, Boston, 4(22), May **1960.** 98 p. figs., tables, refs. Contents (these articles abstracted separately): Blackadar, Alfred K., **A survey of wind characteristics below 1500 ft,** p. 3–11. Cramer, H. E., **Use of power spectra and scales of turbulence in estimating wind loads,** p. 12–18. Segner, E. P., Jr., **Estimates of minimum wind forces causing structural damage in the Dallas tornado,** p. 19–24. Cohen, Edward, **Wind load on towers,** p. 25–42. Changnon, Stanley A., Jr., **A method for determining dry-period probabilities as applied to Illinois,** p. 44–49. Huff, F. A. and Semonin, R. F., **An investigation of flood-producing storms in Illinois,** p. 50–55. Gerdel, R. W., **Snow drifting and engineering design,** p. 57–64. Murphy, Allan H., **Engineering meteorology: meteorology and heating load requirements,** p. 65–68. Boyd, R. A., **Studies in daylight availability,** p. 69–79. Solomon, Irving and Spreen, William C., **Computation of the distribution of maximum allowable gross takeoff weights for aircraft,** p. 80–88. Stokstad, O. L., **The climatic environment as a factor in building roads and airport pavements,** p. 89–91. Legg, F. E., Jr., **Weathering tests of Portland-cement concrete for highways,** p. 92–98. **DWB, DLC**—The 14 papers in this monograph were presented at the Second National Conference on Applied Meteorology sponsored by the American Meteorological Society at Ann Arbor, Michigan in Sept. 1958. The Conference was organized so as to allow an exchange of ideas between meteorologists and engineers interested in: I, Wind effects on structures; II, Hydrology (droughts and floods); III, Environmental engineering (snow drifting, mat loads, illumination); and IV, Transportation engineering (aircraft and highway). The 14 papers are arranged under the four headings given above, with introductory remarks on Pt. I by J. M. Biggs and G. S. Vincent, on Pt. II by C. C. Bates and M. A. Kohler, on Pt. III by M. K. Thomas (Toronto). (none for Pt. IV). *Subject Headings:* **1. Engineering meteorology monographs 2. Wind effects on structures 3. Hydrologic engineering.**—*M.R.*

12.3–2 551.510.52/3:629.13:612

Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mexico, **Aviation medicine: selected reviews.** London, Pergamon Press, **1958.** Pub. for the Advisory Group for Aeronautical Research and Development, NATO. 305 p. Price: 70 sh. (*AGARDograph*, Paris, No. 25.) Five of the papers of interest to meteorologists (abstracted separately) are: Brown, Gerald I., **Measurement of atmospheric ozone,** p. 39–44. Howarth, John L., **Dosimetry of ionizing radiations,** p. 59–84. Hirsch, Frederic G., **Temperature measuring techniques for aviation physiological research,** p. 113–124. Reif, Arnold E., **Aerosols: physical properties, instrumentation and techniques,** p. 168–244. White, Clayton S. and Lovelace, W. Randolph, II, **Spectrometric methods: gas analysis by quantitative emission spectroscopy. DWB.** (629.1323 N864a), **DLC.** Review in *Nature*, London, 183(4671): 1291–1292, May 9, **1959.**—In the course of assessing recent advances in instrumentation and related methodology which might be of value to those interested in Aviation Medicine, twelve senior scientists prepared papers reviewing selected topics relevant to some of the biomedical aspects of flight. The authors working in technical areas in which each was experienced, perused a considerable number of publications, over 700 of which were cited as references to valuable scientific material. The aim was to document condensed sources of information summarizing specialized portions of the aeromedical and related sciences. A total of 12 manuscripts were prepared and all are reproduced in this volume for the convenience of physicians who are aeromedically oriented and for other scientists who need and desire a condensed guide to specialized sources of data. *Subject Headings:* **1. Aviation medicine 2. Bibliography of aviation medicine. I. White, Clayton S.** (*ed.*) **II. Lovelace, W. Randolph II** (*ed.*) **III. Hirsch, Frederic G.** (*ed.*)—*From introduction.*

## A2. TEXTBOOKS

12.3–3 551.**508.29**(02)

*†Popov, M. M., **Termometriia i kalorimetriia.** [Thermometry and calorimetry.] 2d ed. [Moscow], Izdatvo Moskovskogo Universiteta, **1954.** 941 p. 465 figs., 114 tables (No. 44 fold. in pocket), 29 tables in appendix, bibliog. by ch., p. 795–826, 109 eqs. **DLC** (QC254.P75 1954)—This huge text is devoted principally to calorimetry but the first 6 chapters (p. 7–306) deal with thermometers: 1) temperature scales, 2) heat transfer, 3) fixed points on thermometer scales, 4) thermometer construction, 5) thermocouples, and 6) mercury thermometers. Pt. II (p. 307–666) goes very thoroughly into calorimetry and Pt. III (p. 667–771) deals with electrical methods of registering and regulating temperature. The 29 appendices (p. 795–926) cover all manner of conversion factors, constants, scales, etc., and include a voluminous bibliography (by chapters) and a subject index. Of the >600 references in the bibliography, all but a few are to Western literature. Among the subjects covered (with ample theory, illustrations, data, etc.) are thermistors, high and low temperature recording devices, Wheatstone bridges, gas thermometers, hypsometers, compensation devices, cryostats, thermostats, sensitivity calibration of all types of instruments, etc., etc. *Subject Headings:* **1. Thermometry textbooks 2. Calorimetry textbooks 3. Electrical temperature recording equipment.**—*M.R.*

12.3–4 551.**579**:551.49(02)

*†Ovchinnikov, A. M., **Obshchaia gidrogeologia.** [General hydrogeology.] 2d ed. Moscow, Gosud. Nauchno-Tekhnicheskoe Izdatvo Literatury po Geologii i Okhrane Nedr, **1955.** 382 p. 199 figs., 49 tables, bibliog. p. 372–380. **DLC** (GB661.09 1955)—A large, systematic text covering: 1) history of hydrogeology; 2) hydrologic cycle; 3) thermal conditions in air, soil, ground water and earth's core; 4) water in the atmosphere (humidity, evaporation, precipitation, air masses); 5) climatic types and characteristics of U.S.S.R; 6) runoff and surface waters of continents; 7) water in the earth's core; 8) ground water movements; 9) chemical and physical properties of ground water; 10) chemical analysis of ground water; 11) origin of chemical composition; 12) classification of ground water; 13) soil and bog water; 14) ground water near the earth's surface; 15) artesian water; 16) interstitial water; 17) karst water; 18) ground water in permafrost; 19) mineral waters; 20) springs; 21) methods of research and charting. An excellent bibliography of Russian literature on hydrogeology is appended. *Subject Headings:* **1. Hydrogeology textbooks 2. Ground water.**—*M.R.*

12.3–5 551.**510.42**(02)

*†Faith, W. L. (*Air Pollution Foundation*), **Air pollution control.** N. Y., John Wiley; London, Chapman & Hall, **1959.** 259 p. figs., photos, tables, bibliog. at end of each ch. **DWB** (M10.42 F174ai)—This book is intended to present the basic facts that must be considered in any air pollution control program, whether voluntary or required by law. The presentation and the language used in discussing various aspects of the problem can be easily understood by the intelligent layman. The book begins with an explanation of the effects of air pollution and the importance of meteorological variables. A discussion of the nature and source of the more common air pollutants follows. Detailed consideration is given to methods of determining the amounts of various contaminants in the air, the most appropriate means of controlling emissions at the source, and the legal means available for control Mention in varying detail is also made of the newer aspects of air pollution, particularly the radioactivity. Ample use has been made of graphs, tables and photographs to illustrate pertinent points. *Subject Headings:* **1. Atmospheric pollution textbooks 2. Atmospheric pollution control programs 3. Atmospheric pollutants.**—*I.S.*

12.3–6 551.511.32:532.52(02)

†Eckart, Carl Henry (*Univ. of Calif. Scripps Inst. of Oceanog.*), **Hydrodynamics of oceans and atmospheres.** N. Y., Pergamon Press, **1960.** 290 p. 90 figs., 11 tables, refs. at end of each ch., numerous eqs. **DLC** (QA911.E25)—This text contains a systematic account of the simplest motions of a stratified compressible fluid. The author observes that the greater part of the book could have been written fifty or sixty years ago since it contains the basic principles which serve as a foundation to the theory of geophysical turbulence. Basic equations and the elements of thermodynamics are explained. Chapters present information on the perturbation equations, steady motion, the earth's atmosphere, oceans and lakes, theory of rays and waves. The general theory of the residual equations is discussed. *Subject Headings:* **1. Hydrodynamics textbooks 2. Ray theory 3. Wave theory 4. Thermodynamics 5. Perturbation equations 6. Reynolds numbers 7. Hydrodynamics of oceans 8. Hydrodynamics of atmosphere.**—*E.Z.S.*

## A3. BOOKS AND MONOGRAPHS

12.3–7 551.582.1(73)

Buzovkin, B. A., **Klimat Soedinennykh Shtatov Ameriki.** [Climate of the United States.] Leningrad, Gidrometeoizdat, **1960.** 102 p. 23 figs., table. **DWB** (M82.1/73 B992kL)—A popular pamphlet giving general information on the climate of the U. S., with some representative data in brief tables and on isoline charts. The first chapter discusses the physical geography of North America and the U. S.; Ch. II, climatic controls, such as radiation and circulation regimes; Ch. III, climatic regions and the complex factors influencing their climates; Ch. IV, the basic climatic elements and weather conditions (temperature, wind, precipitation, weather types and phenomena). Finally, Ch. V takes up agricultural and medical effects of climate. The publication is intended for geography students, tourists and others interested in the natural conditions of the Western Hemisphere. *Subject Headings:* **1. Climate of the U. S. 2. U. S.**—*M.R.*

12.3–8 551.582.1(573):551.43 551.589(573)

§*†Arkhangel'skiĭ, Viktor L'vovich, **Vliianie Sikhote-Alinia na sinopticheskie protsessy i raspredelenie osadkov.** [Influence of the Sikhote Alin on the synoptic processes and distribution of precipitation.] Leningrad, Gidrometeoizdat, **1959.** 163 p. 39 figs., 29 tables, 198 refs. **DLC** (QC925.5 R9A7)—An analytical treatment of the climate of the Sikhote Alin mountain region of the Soviet Far East in the Maritime Territory. The climatology is approached from the synoptic point of view with consideration of the effect of seasons, topography and orography (effect of the Sikhote Alin mountains and monsoons), etc. on the general circulation and on the local weather processes. The history of the study of the climate and synoptic meteorology of eastern Siberia and its present status are reviewed at some length (p. 5–21) from 1732–1958. The work is divided into two major sections: I. Characteristic atmospheric processes in the region (path and speed of movement of cyclones and anticyclones; western and southwestern cyclones, summer Okhotsk anticylones, effect of orography and frontal deformation on summer precipitation, transformation of air masses and mean monthly air temperature distribution in January and July in the Maritime Territory and II. Origin of precipitation and causes of its local distribution (annual variation, atmospheric factors affecting precipitation, duration and predominance of types processes by seasons; and vertical gradient of precipitation.) Three appendices give tabulations of data on time and amount of precipitation, anticyclonic activity, etc. More extensive data on synoptic types and illustrative surface and 500 mb synoptic charts, barograph cyclone track and isohyetal charts, tables of precipitation, anomalies by month and year, etc. are included. An excellent bibliography of 160 Russian and 38 non-Russian titles is appended. *Subject Headings:* **1. Climate of Sikhote Alin 2. Synoptic climatology of Soviet Far East 3. Orographic influences 4. Sikhote Alin, Maritime Teritory.** —*M.R.*

12.3–9 551.582.1(477)

*Buckinskiĭ, Ivan Evstaf'evich, **Klimat Ukrainy.** [Climate of the Ukraine.] Leningrad, Gidrometeoizdat, **1960.** 129 p. 39 figs., 5 tables. **DWB** (M82.1/477 B919kL)—A popular

(5000 copies) pamphlet giving a systematic sketch of the climate of the Ukraine; I. Climatic controls (radiation, atmos. circulation, effect of ground surface); II. Seasonal changes (4 seasons); III. Climatic elements (temp., wind, precip., snow cover, fog, ice, thunderstorms, hot winds); IV. Climate of the 6 physiogeographic regions of the zone (forest, forest steppe, steppe, Carpathians, Crimean mountains and southern coast of Crimea) and V. Climatic changes and variations. The various sections are illustrated with standard climatic-statistical graphs or charts, maps, tables of the data for 8 stations, photographs, etc. The treatment is much more analytical than is usually found in such works—for instance, probabilities are specified for various elements and places. *Subject Headings:* **1. Climate of the Ukraine 2. Ukrainian S.S.R.**—*M.R.*

12.3–10 551.5(09)(510) 550.34(510)

*†Needham, Joseph and Ling, Wang (*both, Cambridge Univ.*), **Science and civilization in China.** Cambridge, University Press, **1954–1959.** 3 vol. Vol. 1, **1954** (318 p.). Vol. 2, **1956** (696 p.). Vol. 3, **1959** (874 p.). numerous figs., plates, refs. throughout. **DLC** (DS721.N39)—The first three volumes of this magnificent 7 volume work contain material on the history of meteorology and other earth sciences in China before 1800, starting with the earliest dynasties. Ch. 4 of Vol. 1 gives some detailed information on the geography and especially the tectonics of China (p. 63–67) and its influence on migrations and communications and hence the civilization of China. Vol. 3 covers **Mathematics and the sciences of the heavens and the earth.** Included is a comparison of mathematics in China with that of the West (170 p.), astronomy (p. 171–461), meteorology (p. 462–494), geography and cartography (p. 497–590), geology (591–623), mineralogy (p. 636–680) and seismology (p. 625–635). China has the longest and most complete series of records of earthquakes for any part of the earth (–780 to date) and the oldest seismograph (earthquake weathercock). It was devised by CHANG HÊNG in the 2nd century and used until the 6th century to determine the direction of earthquakes. There were 908 recorded shocks with precise data up to 1644. In 1556 >800,000 people were killed in 3 provinces. Theory began in the 8th century B.C. but little progress was made and even the seismograph fell into disrepute from the 6th century on. In meteorology the Chinese were in advance of the West and kept more complete records over a longer time. Sources of climatic and meteorological information (temperature, precipitation, drought, floods, rainbows, parhelia, winds, thunder and lightning, auroras –208 to 1639, tides, etc),. data and observational methods are carefully cited and equipment and records illustrated in photographs, diagrams and tables. An aurora cited in 763 was also cited in Anglo-Saxon and Irish Chronicles. *Subject Headings:* **1. History of Chinese science 2. Chinese meteorology 3. Chinese seismology 4. China.**—*M.R.*

12.3–11 551.515.3(73)

†*Wolford, Laura V. (*Office of Climatology, U. S. W. B.*), **Tornado occurrences in the United States.** *U. S. Weather Bureau, Technical Paper,* No. 20, rev. **1960.** 71 p. 16 figs., 13 charts, 12 tables, 37 refs. **DWB** (M(055) U587t). (For abstract on the 1952 edition, *see* 4.8–110, Aug. 1953, *Met. Abs.*)—This revision of the first edition of *Technical Paper,* No. 20 extends the data to include the years 1951 through 1958 and contains additional textual material, tabulations, and charts. The detailed statistics presented herein relative to areal distribution, hours of occurrence, loss of life, property damage and frequency of occurrence are based on the 43-year period beginning with 1916 and extending through 1958. Funnel clouds aloft and water spouts are presented in separate tabulations. Charts show the tracks of tornadoes during each month from 1916–1958. A tornado rose for the United States shows that 57.8% moved from the southwest. Tornado characteristics and oddities, forecasting of occurrences in the United States and other countries are discussed. *Subject Headings:* **1. Tornado data 2. United States.**—*E.Z.S.*

12.3–12 551.**577**(73)

†*U. S. Weather Bureau, **Generalized estimates of probable maximum precipitation for the United States west of the 105th meridian for areas to 400 square miles and durations to 24 hours.** Prepared by Cooperative Studies Section Hydrological Services Division U. S.

Weather Bureau for Engineering Division Soil Conservation Service U. S. Dept. of Agriculture. Its *Technical Paper*, No. 38, **1960.** 66p. numerous figs. (6 fold), numerous tables, 40 refs. **DWB**—This report not only deals with the final results but goes into as much detail as appears necessary to provide the engineer with an adequate background for use of the results. Chapter headings are 1) Precipitation process, 2) Precipitation rates, 3) Meteorological analysis of major storms of the West, 4) Evaluation of probable maximum precipitation, 5) Generalization and maintenance consistency, 6) Probable maximum precipitation west of the 105th Meridian, 7) Estimating probable maximum precipitation for specific watersheds. Basic storm study data and a glossary are appended. *Subject Headings:* **1. Maximum possible precipitation 2. Precipitation data 3. United States.**—*E.Z.S.*

12.3–13 **551.558.2:551.511:551.509.312**

*U. S. Navy Weather Research Facility, **Vertical motion and weather.** [**Report on Task 30: Evaluation of numerical weather prediction techniques.**] Its [*Pub.*] *NWRF* 30-0359-024, March **1959.** 46 p. figs., tables, 4 refs. **DWB** (M09.312 U585ve)—Vertical motion is recognized as an important parameter in the atmosphere. The extensive regions of precipitation associated with extratropical cyclones are regions of large scale upward motion of air through most of the troposphere. Similarly, the nearly cloud free regions in large anticyclones are regions in which air is subsiding through a large portion of the troposphere. Vertical motions also affect temperature, humidity, and many other meteorological variables. In spite of its importance, large scale vertical motion is not measured directly. Numerous indirect methods of calculating it have been devised, all of which involve approximations of some sort. Some of these methods are more satisfactory than others; some are practical to calculate only if a high speed computer is available. This publication discusses methods of determining large scale vertical motion and some uses of it as a synoptic parameter. Its use as a predictor of precipitation, including quantitative prediction is emphasized. Throughout the entire publication, except for certain background material, the discussion is directed toward use by a small weather forecast unit such as that aboard an aircraft carrier. *Subject Headings:* **1. Vertical motion 2. Numerical forecasting.**—*Summary of publication.*

12.3–14 **551.509.616/7** **551.574.1**(47)

*†Nikandrov, V. Ia., **Iskusstvennye vozdeĭstviia na oblaka i tumany (Mikrofizicheskie osnovy).** [Artificial influences on clouds and fog: microphysical basis.] Leningrad, Gidrometeoizdat, **1959.** 190 p. 62 figs., 50 tables, bibliog. p. 178–190, eqs. **DWB** (M09.6 N792is) —A detailed and objective monograph on cloud physics and artificial seeding of clouds or fog, written by a scientist who has worked exclusively in this field for over a decade. The theory is developed at some length, experimental data are analyzed and presented in tables and charts and many photos are included to show results, equipment or techniques. After an historical survey, six chapters take up: I. Material processes of drop formation with nucleation; II. Formation and interaction of ice and water particles; III. Microphysical properties of clouds and fog; IV. Action of dry ice in the laboratory and field; V. Physical basis and application of dry $CO_2$ for modification of super-cooled clouds and fog; VI. Use of crystals of AgI or PbI and other crystalline substances to seed clouds or fog at different temperatures. Results are shown in detailed tables. A good bibliography comprises references to 230 Russian and 100 non-Russian works in this field, dating from the turn of the century to 1958. Emphasis seems to be on studies of the microphysics of freezing and drop formation. Early attempts in Russia to produce rain by electrical means by B. P. VEINBERG continued from 1924–1941. In 1931 a conference was held in Moscow on war against drought and an institute was established there under S. L. BASTAMOV for artificial rain production and at the same time branches were established at Leningrad under V. N. OBOLENSKY, in Odessa under M. A. AGANINA and in Ashkhabad under V. A. FEDOSEEV. The Leningrad Institute grew rapidly and became an independent Institute for Experimental Meterorology (I.I.E.M.). *Subject Headings:* **1. Cloud physics monographs 2. Cloud seeding in U.S.S.R. 3. U.S.S.R.**—*M.R.*

12.3–15 **551.506.1**(512.318) **551.582.1**(512.318)

*Ferreira, Herculano Amorim, **O clima de Portugal, Fasc. 10, Província de Macau.** [The climate of Portugal, Pt. 10, Macao Province.], Lisbon. Serviço Meteorológico Nacional, **1960.**

40 p. 6 figs., 4 tables. **DWB** (M82.1/469 P853c)—This is the tenth in a series of reports devoted to the climate of Portugal and its territories. Tables of monthly climatological data for Macao Observatory based on the period of record 1921–50, are preceded by a history of the weather observing program and a full listing of the various publications in which data for the observatory have appeared. The article continues with a discussion of factors affecting the climate of Macao, with special emphasis on the synoptic climatology of the area and a detailed classification of the main synoptic weather types. The climatological tables referred to above include mean pressures (station and sea level values), mean cloud, humidity, evaporation, mean and extreme temperatures, mean precipitation and 24-hour maximum, wind direction frequencies and mean speeds, and the number of days with clear and cloudy sky and with various special phenomena. *Subject Headings:* **1. Monthly climatic data 2. Climate of Macao 3. Macao Province.**—*R S. Quiroz.*

## A4. ATLASES—HANDBOOKS

12.3–16 551.**582.3**(265/266)

*U. S. Office of Naval Operations, **U. S. Navy marine climatic atlas of the world, Vol. 5, South Pacific Ocean.** Its *NAVAER* 50-1C-532, issued Nov. 1, **1959.** xv. p. of introductory text. 267 charts (in color), 50×34 cm. (For abstract on Vol. 1–4, *see* 11A–92, Jan. 1960, *Met. abs.*) **DWB** (M82.3 U585m)—This volume is the fifth in a set which when completed will include all the oceans of the world. The scope of this volume is similar to the previous ones (*see* 8.5–81, 8.9–13, 9.11–29 and 11A–92, *Met. Abs.*) The graphic presentations of the surface and upper air graphs are comparable with those of the volumes on the Indian and South Atlantic Oceans. A chronological bias introduced in the available data is due to the fact that the eastbound passage of the sailing ship is now studiously avoided by the modern ship, leaving available data only from the whaling ships and occasional supply ships traversing this area in connection with Antarctic expeditions, and also to the fact that the opening of the Panama Canal resulted in a marked reduction in marine traffic around South America. The text provides information concerning the processing of observations, dealing with the charts in general, with the general plan for surface charts, surface graphs and tables, surface isopleths, upper air charts, the observations and their processing, surface observations, island stations, upper air observations; it lists the upper wind stations and the radiosonde stations with their geographic coordinates, periods of records and other remarks. It also includes explanatory text to the features of the atlas which is divided into two main sections. The section of surface charts includes charts of surface winds, gale roses, visibility, precipitation, cloudiness, wind-visibility-cloudiness, dew point, temperature, wet bulb temperature, temperature and wind speed, sea level pressure, air-sea temperature difference, tropical cyclones. The individual upper air charts contain those on wind aid, wind retard, wind roses, height of pressure surface, temperature and humidity modified refractive index, incessions, height of tropopause, height of freezing level, potential aircraft icing. A list of references and a chart index supplements the text part. The excellent draftsmanship with the various appropriate informative features of the charts, is a feature of this as of the previous volumes. On the other hand the presentation of graphic and tabular data combining several elements, difficult to interpret even with a magnifying glass, is somewhat compensated for by the convenient size of the atlas. *Subject Headings:* **1. Marine climatic atlases 2. Upper air atlases 3. South Pacific Ocean.**—*O.T.*

12.3–17 551.506:551.542 551.506:551.524 551.506:551.577

†*Sokhrina, Raisa Fedorovna; Chelpanova, O. M. and Sharova, V. Ia., **Davlenie vozdukha, temperatura vozdukha i atmosfernye osadki severnogo polushariia.** [Atmospheric pressure, air temperature, and precipitation for the Northern Hemisphere.] Leningrad, Gidrometeoizdat, **1959.** 473 p. 3 figs., almost entirely tables, 213 refs. At head of *t-p.*: Glavnoe Upravlenie Gidrometeorologicheskoĭ Sluzhby pri Sovete Ministrov SSSR, Glavnaia Geofizicheskaia Observatoriia. Also: **Atlas kart** [Atlas of charts]. 4 p. of text. 38 charts, 43×48 cm, **1959. DWB** (M82 S683da)—This impressive publication contains tables of monthly and annual long-period mean values of pressure (1212 stations) (both at station elevation and reduced to sea level), temperature (1854 stations), and precipitation (2958 stations). It should be noted that the U.S.S.R. stations are omitted from the sections on temperature and precipita-

tion, although the data were available for the construction of isoline charts presented in a companion atlas. This atlas contains monthly and annual circumpolar maps of the Northern Hemisphere, for mean sea level pressure, sea level temperature, and precipitation amount. For pressure and temperature the sources, and in the case of stations in the U.S.S.R., the data were specially worked up by the Soviet Central Geophysical Observatory. In addition to the maps and tables of data, there are useful discussions, of moderate length, of the data reduction methods and of the hemispheric distribution of the parameters under consideration. *Subject Headings:* **1. Northern Hemisphere pressure data 2. Northern Hemisphere temperature data 3. Northern Hemisphere precipitation data. I. Drozdov, O. A.** (*ed.*) **II. Pokrovskaia, T. V.** (*ed.*)—*R. S. Quiroz.*

12.3–18 550.3(02) 551.5(02)

†**Handbook of geophysics.** Rev. ed. Ed. by C. R. Campen, Jr.; A. E. Cole; T. P. Condron; W. S. Ripley; Norman Sissenwine and Irving Solomon. N. Y., Macmillan, **1960.** 22 ch. separately paged (680 p.) figs., tables, bibliogs., eqs. On *t-p.*: U. S. Air Force, Air Research and Development Command, Air Force Research Div., Geophysics Research Directorate. "First pub. in 1957 by the Air Force." (*See* 10.1–3, Jan. 1959, *Met Abs.* for abstract on 1957 ed. For listing of articles in the 1957 ed., *see* Vol. 9, p. 1460, Nov. 1958, *Met. Abs.*) **DWB, DLC**—The new edition of the valuable Handbook of geophysics for Air Force designers compiled by the Geophysics Research Directorate of the USAFCRC is essentially the same as was the original (1957) edition. The chief difference lies in the fact that the revised edition is published commercially and so is a little more elegant, and that it contains new data in the chapters on model atmospheres (Ch. 1) where the second section covers the ARDC Model Atmosphere, 1959 rather than 1956 as in the earlier edition, and in Ch. 18 a section (18.5) has been added to give a model of the high intensity radiation belts near the earth, known as the Van Allen belt. Additional references in this section brings the chapter on cosmic rays up to 1959. The 1959 model is shown graphically up to 1000 km and in tables up to 700 km (data for 700–1000 km are extrapolated by use of dashed lines). Below 53 km the data in the 1956 and 1959 models agree, but at higher levels they differ by as much as a factor of 20. The satellite data are considered to be good enough to use in spite of possible complicating factors. A list of 58 authors (2 more than in the 1957 ed.) who contributed to the volume includes many well known geophysicists from DAVID ATLAS and A. E. COLE to C. E. JUNGE, H. H. LETTAU, J. A. PEOPLES, S. B. SOLOT, IRVING SOLOMON and J. A. WINKLER. The main chapters include: 1) Model atmospheres, 2) Temperature, 3) Pressure, 4) Density, 5) Wind, 6) Precipitation, 7) Clouds, 8) Atmospheric composition, 9) Atmospheric electricity, 10) Geomagnetism, 11) Meteors, 12) Oceanography, Snow, Permafrost, Geodesy, 13) Micro-wave propagation; 14) Visibility and Albedo; 15) Ionosphere, Aurora and Airglow; 16) Thermal radiation, 17) the Sun, 18) Cosmic radiation, 19) Contrails, 20) Rockets, Balloons and other Sounding instruments 21) Acoustical propagation. A good 11 page (3-col.) subject index is included and bibliographies are appended to each chapter. Of course the major value of the Handbook is the wealth of critically evaluated and compiled working or design data in both tabular and graphic form, obtained from all possible literature sources. *Subject Headings:* **1. Handbook of geophysics 2. Upper atmospheric data 3. Design data handbooks. I. Campen, C. R., Jr. II. Cole, A. E. III. Condron, T. P. IV. Ripley, W. S. V. Sissenwine, N. VI. Solomon, I.**—*M.R.*

## A5. NEW SERIALS

*See:* **Ice: News Bull. of Brit. Geol. Soc., 12.3–211.**

## A6. IGY—WMO

*See also:* **Report of Warsaw meeting of WMO. Agric. Met. Commission,** 12.3–58; **Warsaw meeting of WMO. Agric. Met. Commission** (Kulik), **12.3–59.**

12.3–19 551.506.22:778.142

McMurray, William M., **IGY meteorological data on microcards.** *International Geophysical Year, 1957/1958. IGY World Data Center A, Wash., D. C., IGY General Report,* No. 9, June 1960. 142 p. 12 figs. (incl. photos) 8 tables, 11 refs. **DWB** (M01.4 1612in)—The first part (p. 1–37) gives detailed explanation and illustration (with specifications) of the organization and coding of the data and for use of the readers. Four types of forms (hence 4 types of card layout) were used. As a rule stations are grouped by WMO index numbers, and the data for a pentad (5-day period) included on one card for a group of stations. Remote stations are treated separately. Each card has a heading visible to the naked eye. A list of participating countries is included. All IGY meteorological (surface land and sea and upper air) data for the world has been put (or is being put) on microcards by World Data Center C (WMO headquarters, Geneva) and sets deposited in WDC-A (U. S.) and WDC-B (U.S.S.R.). The present report gives the status, to date, of the program in order to provide a reference manual for research workers interested in meteorological data. The total number of microcards for Pts. I (synoptic land), III (radiosonde and rawinsonde observations) and IV (upper wind observations) is estimated as 2530, 5280 and 5060, respectively or 12,870 all told for 110 pentads of IGY, exclusive of data from remote stations and special microcards in Pt. III. The second part of the report (p. 39–141) consists of a detailed catalog of microcards received to date (June 1960) in WDC-A at Asheville, N. C. It is estimated that 70% of the total to be expected has been received. *Subject Headings:* **1. IGY microcards 2. Microcards of IGY meteorological data 3. IGY World Data Center-A, Asheville, N. C.**—*M.R.*

12.3–20 551.5:550.3:061.3

Steinhauser, F. (*Zentralanstalt für Meteorologie und Geodynamik, Vienna*) **Das Internationale Geophysikalische Jahr, 19: Der Anteil Österreichs am internalen Forschungsprogramm.** [The International Geophysical Year, No. 19: Austria's participation in the international research program.] *Umschau*, Frankfurt a.M., 58(15):462–464, Aug. 1, **1958.** 2 photos, map. **DLC**—The initiation of the idea of an International Polar Year by KARL WEYPRECHT in Austria, Austria's participation in the First International Polar Year 1882–1883 and its contribution to the current IGY program are discussed. Austrian research is concentrated on Austria itself. The work is coordinated by the Geophysical Commission of the Austrian Academy of Sciences. The report center is the Zentralanstalt für Meteorologie und Geodynamik in Vienna. The centers of investigation constitute the following: Zentralanstalt für Meteorologie und Geodynamik in Vienna, Bundesamt für Eich- und Vermessungswesen (Federal Bureau of Calibration and Measurement), Institute of Meteorology and Geophysics of the University of Innsbruck, the Hafelekar Observatory, Institute of Meteorology and Geophysics of University of Graz, Sonnblick Observatory and the Kanzelhöhe Observatory. The particular scientific programs at the various institutions are listed and the special instrumentation set up (such as radar for wind aloft observation, installation of radiation recording equipment, measurement of heat exchange over the surface, measurement of radioactivity etc.) are described. *Subject Headings:* **Austrian participation in IGY 2. International Polar Year 1882–1883 3. Austria.**—*I.L.D.*

12.3–21 551.506.5:91.04(99) 551.506.22:016.3

Kosack, H. P., **Japanische und argentinische Beiträge zur Landeskunde der Antarktis.** [Contribution of Japan and Argentina to Antarctic geophysics.] *Polarforschung*, Kiel, Ser. 4, 27(1/2):47–50, 1957, pub. Aug. 1, **1959. DWB**—The author comments briefly on two series of publications which contain valuable and important material for studies concerning the polar regions. The first series: **Antarctic Record. Reports of the Japanese Antarctic Research Expedition,** first issued in December 1957 and afterwards at irregular intervals (five parts) gives the preliminary results of observations made at the Japanese Antarctic station Lützow-Holm-Bucht in the framework of IGY, principally in the fields of meteorology, cosmic rays, geomagnetism, glaciology and geology. All-important also are the scientific results, obtained by the Japanese Expedition in 1910–12. The second series: **Publicaciones,** No.1-4 (1955–58) of the Instituto Antartico Argentino, considers general scientific works. *Subject Headings:* **1. Lützow-Holm-Bucht station, Antarctica 2. Japanese Antarctic expeditions 3. Japanese participation in IGY 4. Argentine participation in IGY 5. Antarctica.**—*A.V.*

12.3–22 551.506.22:551.324.5(236.7)

†Charnley, F. E., **Some observations on the glaciers of Mt. Kenya.** *Journal of Glaciology*, London, 3(26):483–492, Oct. **1959.** 5 figs., 28 refs. English, French and German summaries

p. 483. **DWB, DLC**—The glaciological work of the IGY Mt. Kenya Expedition, 1957–58, is described and some results are given. The stages of retreat of the Mt. Kenya glaciers from their former limits are considered with reference to moraine evidence and existing records. A chronology is suggested for fluctuations during the last century. Mapping of the present glaciers has been carried out. The changes undergone by the Lewis Glacier since a previous survey in 1934, are considered. The surface movement of the Lewis Glacier has been measured and its economy examined in relation to the meteorological and climatic environment. *Subject Headings:* **1. IGY glaciological program 2. Glacier retreat 3. Mt. Kenya, East Africa.**—*Author's abstract*

12.3–23 551.5:061.3

World Meteorological Organization, **Final Report of Second Congress, Geneva, April 14–May 13, 1955, Vol. 4, Selection of documents.** Its [*Publication*] *WMO*, No. 48.RC.12, pub. Geneva, **1958.** 270 p. Mimeo. **DWB** (M(06) W927p)—This Final Report includes the President's reports, those of the regional associations, technical commissions and the financial reports from the Secretary-General. Documents on certain technical and administrative aspects are included, as well as a list of the titles of all documents that were presented to the Congress. Eighty-seven members attended the session on April 1, 1955. This was made up of 62 states and 25 territories. The twenty-two new members that have been added since April 26, 1951 are listed. *Subject Headings:* **1. WMO conferences 2. Meteorological conferences.**—*N.N.*

12.3–24 551.5:061.3

World Meteorological Organization, 3rd Congress, Geneva, April 1–28, 1959, **Abridged report with resolutions.** *World Meteorological Organization,* [*Publication*] *WMO*, No. 88.RC.17, **1959.** 187 p. Appendix of 48 p., Technical regulations of the WMO (introd. and Ch. 1–11 without annexes of appendices). **DWB** (M(06) W927p)—Standard form of WMO report on the 3rd Congress, including list of delegated by country, agenda, proceedings, resolutions and technical regulations, budget for 3rd financial period (1960–63), contributions by country, financial regulations, list of 189 documents, etc. *Subject Headings:* **1. WMO Congress reports 2. WMO publications.**—*M.R.*

12.3–25 551.5:629.13:061.3

World Meteorological Organization (and) International Civil Aviation Organization, **Joint ICAO/WMO meteorological telecommunications meeting for Europe, Geneva, Feb. 24–March 8, 1958: Final Report.** *World Meteorological Organization,* [*Publication*] *WMO*, No. 79.RP.32, issued Geneva, **1958.** (117 p.) map (fold.) Mimeo. Text mostly in English. **DWB** (M(06) W927p)—Comprehensive historical background, agenda reports on operational meteorology as well as a recapitulation of relevant recommendations of previous meetings, and the statements of delegations. *Subject Headings:* **1. ICAO/WMO reports. I. International Civil Aviation Organization.**—*N.N.*

## A7. ARCTIC—ANTARCTIC

*See also:* **Wilkins—Arctic and Antarctic explorer** (Wood), 12.3–42; **Arctic navigation,** 12.3–55; **Arctic resupply operations** (French), 12.3–56; **Atmos. ozone** (Larsen), 12.3–259; **Circulation of Arctic stratosphere** (Hare), 12.3–265; **Solar radiation and albedo, Antarctica** (Hoinkes), 12.3–300; **Radiation on Antarctic snowfield** (Hanson), 12.3–301; **Photometry in Antarctica** (Hood), 12.3–302; **Upper air temp., Argentine Island** (Dewar), 12.3–320; **Thermal studies, Alaskan lakes** (Hobbie), 12.3–329.

12.3–26 551.5(98) **551.515.73**(98) **551.524.7**(98)

Belmont, A. D. (*McGill Univ.*), **A brief review of research in Arctic meteorology.** (In: Polar Atmosphere Symposium, Oslo, July 2–8, 1956, **Proceedings, Pt. 1, Meteorology Section.** N. Y., Pergamon Press, **1958.** p. 30–36.) Also issued in *Journal of Atmospheric and Terrestrial Physics*, London, Special Supplement, Pt. 1, **1957.** p. 30–36. **DWB, DLC**—Historic accomplishments and present research as conducted especially by the U. S. and Canada mainly in the Arctic Ocean, Greenland and adjoining coastal belts are reviewed and criticized. The author deplores the serious deficiencies in the publication of data, particularly upper air data. Existing data if made available through processing would yield rich information that could be used in the study of 1) polar trajectory of anticyclones and 2) polar stratospheric temperature fields. *Subject Heading:* **1. Arctic meteorology.**—*W.N.*

12.3–27 550.8:551.501.9(988)

Davies, William E. (*U. S. Geological Survey*), **Background of Greenland studies.** *U. S. Air Force. Cambridge Research Center, GRD Research Notes*, No. 15: 12–14, April **1959.** 2 figs. **DWB**—Brief review of geological studies of 1951, 1955, 1956, 1957 and 1958 which were mainly aimed at evaluating suitable sites for emergency airfields (and weather stations). The photogeological method used is inexpensive and reliable. The studies also contributed to a clear geological picture of North Greenland. *Subject Headings:* **1. Geological studies for site selection 2. Photogeological methods 3. Geology of Northern Greenland 4. Greenland.** —*W.N.*

12.3–28 550.3:551.501.9(98)

Hunkins, Kenneth L. (*Lamont Geological Observ.*), **Station Alpha: Geophysical investigations by the Lamont Geological Observatory, Columbia University.** *U. S. Air Force. Cambridge Research Center, GRD Research Notes*, No. 15:23–25, April **1959.** fig. **DWB**—The program of field studies conducted on the drifting station Alpha is briefly summarized under the following subjects: seismic studies, special wave studies, underwater sound studies, gravity, magnetics, oceanography, ice studies and navigation. *Subject Headings:* **1. Drift Station Alpha 2. Geophysical investigations at Drift Station Alpha 3. Arctic Ocean.**—*W.N.*

12.3–29 551.5:355:551.322

U. S. Air Force, Cambridge Research Center. Geophysics Research Directorate, **Arctic terrain research.** (Prepared by) Terrestrial Sciences Laboratory, Bedford, Mass., Oct. **1958.** 26 p. 7 figs., 24 photos, 18 refs. **DWB** (559.98 U581ar)—The purpose of the research program outlined is to determine the capabilities of Arctic regions for supporting (military) air activities. Research work by universities, groups and individuals, as well as field investigations at Greenland, in Polar regions and Alaska were conducted by several scientific bodies. Very brief information is given on the past, present and future work under sponsorship of GRD, such as: Arctic lake research, sea ice properties, character of shelf ice and its marginal features, snow field research, ice free land research, Arctic Ocean research, Arctic chronology and the Polar bibliography. *Subject Headings:* **1. Arctic terrain research 2. Arctic ice research 3. Military meteorology 4. Arctic.**—*W.N.*

## A8. CONFERENCES—SYMPOSIA

*See:* **Second WMO Congress,** 12.3–23; **Third WMO Congress,** 12.3–24; **Radioactivity conf.,** 12.3–74; **Radio conferences** (Herbstreit), 12.3–103; **Solar physics conf.** (Jäger), 12.3–104.

## A9. SERVICES—OBSERVATORIES

*See also:* **Fireweather services** (Hood), 12.3–84.

12.3–30 551.5:061.1(410)

Drogaĭtsev, D. A., **U meteorologov i gidrologov Anglii.** [A visit to English meteorologists and hydrologists.] *Meteorologiia i Gidrologiia*, Leningrad, 6:59–61, June **1959. DWB, DLC**—The author reports on his visit, together with S. L. Mandel'shtam, to Great Britian where he delivered lectures on marine meteorology and on long range hydrometeorological forecasting. He describes briefly the organization of the British Weather Service, the forecasting center at Dunstable, the work of the synoptic center, the types of forecasts issued, analog forecasting methods, objective forecasting with the aid of computers, etc.; the climatological center at Harrow and its work; the Hydraulics Institute at Wallingford; Institute of Tides at Liverpool;

Scott Polar Institute at Cambridge; the Cavendish Physics Laboratory, etc. *Subject Headings:* **1. British Meteorological Service 2. Great Britain.**—*I.L.D.*

12.3–31 551.5:061.1(410)

**Reorganization of the Meteorological Office.** *Nature*, London, 181(4604):241–242, Jan. 25, **1958. DWB, DLC**—A summary of the recommendations made by the committee under LORD BRABAZON (established in 1955) to review the reorganization of the Meteorological Office. The Committee agreed that the Air Ministry should continue to be responsible for the Meteorological Office; as possible lines of advance it singled out the development of numerical forecasting. It recommended the internal reorganization into three "prongs" dealing, respectively, with forecasting and services, research and administration. This reorganization was effected July 1957. Several new posts in the grade of senior principal scientific officer have been created. The reorganization is especially striking on the research side. The organization of the research department is outlined. Also the system of general supervision of the work of the Meteorological Office has been altered in that the supervisory Meteorological Committee consists of individuals from outside the government. *Subject Headings:* **1. British Meteorological Service 2. Great Britain.**—*I.L.D.*

12.3–32 551.5:061.1(560)

Teweles, Sidney, **The Turkish State Meteorological Service: Final report.** Ankara, Turkey, June 30, **1957.** 13 p. appendices. At head of cover-title: United States of America Operations Mission to Turkey. Mimeo. **DWB** (M(06) T354tu)—The Turkish Meteorological Service dates back to 1579. After World War II the U. S., the WMO, and the ICA offered meteorological training and technical aid to the nation because of its strategic importance. This is a report on the meteorological training courses now under way in the areas of forecasting, climatology, microclimatology, hydrometeorology, instrumentation, etc. *Subject Headings:* **1. Turkish Weather Service 2. Meteorology education 3. Turkey.** –*N.N.*

12.3–33 551.509.5:061.1(497.1)

Milutinović, R., **Služba za prognozu vremena treba da bude korisna.** [Weather forecasting service must satisfy practical needs.] *Yugoslavia. Hidrometeorološka Služba, Vesnik,* 4(1/2):23–29, Jan./June, **1955.** eqs. **DWB**—The economic value of weather forecasts may be derived from (a) the number of days with a harmful weather phenomenon, (b) damage per day if no preventive measures are taken, (c) daily cost of preventive measures and (d) accuracy of forecasts. The article contains comments and suggestions regarding functional planning of the Yugoslav Meteorological Service. *Subject Headings:* **1. Forecasting services 2. Forecast accuracy 3. Yugoslavia Meteorological Service 4. Yugoslavia.**—*G.T.*

12.3–34 551.5:061.1(52) 551.46:061.1(52)

Terada, K. and Hanzawa, M. (*both, Japan Met. Agency, Tokyo*), **Recent works in relation to the activities of the Marine Division of the Japan Meteorological Agency.** *Geophysical Magazine*, Tokyo, 28(1):117–133, Aug. **1957.** fig., tables, 20 refs. **DWB, DLC**—A general history of meteorological development including achievements in marine sciences and oceanography and governmental organizations and research agencies. On July 1, 1956, the name of the Japanese Weather Service was changed from Central Meteorological Observatory to Japan Meteorological Agency (JMA) as well as the function and scope of line organization. Maritime meteorology of JMA, under control of the Marine Division, consists of four major sections; ship operation section, maritime meteorology section, oceanographic section, and island section. Future plans include the following: routine oceanographic observations and research, governmental plan for preventing damage from meteorological tides, long range forecasting of ocean temperatures, and oceanographic research in Ariake Bay. *Subject Headings:* **1. Marine meteorological services 2. Japanese Meteorological Service.**—*K.C.*

12.3–35 551.5:550.3:06(549)

Thirlaway, H. I. S., **Geophysics in Pakistan.** *Geophysical Journal*, London, 2(3):241–247, Sept. **1959.** 16 refs. **DWB, DLC**—The paper briefly surveys Pakistan's interest in geophysics.

Geophysical activities in the country are only in initial stages. However, these various activities have found a center in the Geophysical Institute at Quetta. The institute was established in 1951 as a result of a basic agreement between Pakistan and UNESCO to create a center in Pakistan for the geophysical study of the earth and its atmosphere. The paper gives a brief description of how UNESCO has continued to help the institute by providing consultants, equipment and fellowships. Activities in the fields of seismology, geomagnetism, physical geodesy, geodynamics and applied geophysics are summarized in separate sections and the geophysicists connected with them are introduced. It is pointed out that, since there were no geophysical centers, laboratories, nor geophysicists in Pakistan at all before 1951, the country needs expansion of geophysical activities as well as more qualified geophysicists. *Subject Headings:* **1. Geophysical programs 2. Geophysics in Pakistan 3. Pakistan.**—*I.S.*

12.3–36 551.5:550.3(51)

Jaw, Jeou-jang and Fu, Cheng-yi (*both, Inst. of Geophys. & Meteor. Academia Sinica*), **Advancement of geophysical sciences in China 1949–1959.** *Scientia Sinica*, Peking, 8(9): 910–920, Sept. **1959. DLC**—The paper outlines the principal results that were obtained in the field of geophysics during the last ten years in China. Since 1956 geophysical activities have been made a part of a 12-year plan for the long range development of science and technology. The paper surveys the progress in the fields of meteorology, physical oceanography, seismology and geophysical prospecting. 1958 was an especially good year. This year a new method of supplementary weather forecasting by a single station was developed and put into practice in the district of Chen-Hsiung in Yunnan and many other places. This raises the accuracy of forecasting to better than 85%. Two books dealing with some fundamental problems of general circulation of the atmosphere and the meteorology of the Tibetan Plateau, respectively, were published. A portable seismograph of high sensitivity was designed and a new quantitative wave analyzer was designed and constructed. *Subject Headings:* **1. Geophysical research 2. Progress in meteorology 3. China.**—*I.S*

## A10. EDUCATION—HISTORY—BIOGRAPHY—BIBLIOGRAPHY

### History

*See:* **Chinese sci.** (Needham, Wang), 12.3–10; **History of physics** (Seeger), 12.3–37.

### Biography

12.3–37 53:92 551.5:92

†Seeger, Raymond J. (*Nat'l. Science Foundation*), **Franklin as a physicist.** *Washington Academy of Sciences, Journal*, 49(5):129–145, May **1959.** 38 refs. **DWB, DLC**—The name, BENJAMIN FRANKLIN, is respected by the nation yet any impression in men's minds of his versatile genius is only too hazy, especially of his contributions as a physicist. In the field of science he is generally regarded as a gadgeteer and a utilitarian par excellence. The author, by elaborate documentation, attempts to dispel this impression, pointing out that FRANKLIN was concerned, in the first place, with the quest for scientific knowledge and then only with a search for its usefulness. His contributions, especially in the field of electricity, are surveyed at length and reference is made to his delight in investigating various meteorological phenomena. It is recommended that FRANKLIN'S scientific contributions should be made part of history of science courses in the nation's schools. *Subject Headings:* **1. Biography of Benjamin Franklin 2. Franklin, Benjamin 3. History of physics.**—*I.S.*

12.3–38 551.5:550.3:662.2:539.1:92

Fiebiger, Nikolaus, **Über die Verwendung von Kernexplosionen zu friedlichen Zwecken.** [Peaceful uses of nuclear explosions.] *Umschau*, Frankfurt a.M., 59(7):196–197, April **1959.** fig., 2 tables, 4 refs. **DLC**—This paper is tribute to Otto Hahn on his 80th birthday, It deals with peaceful ways to utilize the splitting of uranium, which was discovered by HAHN in 1939. There are several possibilities mentioned: atomic explosions for climatic changes by modifying water bodies, prevention of earthquakes through timely checking of stress in the earth's crust, controlled deflection of lava streams, deep mining, sub-surface water utilization, etc. These ideas are based on U. S. data from subterranean explosions on Sept. 19, 1957. *Subject Headings:* **1. Nuclear explosions for peacetime use 2. Hahn, Otto.**—*W.N.*

12.3–39 551.5:551.46:92

Orlov, Boris Pavlovich, **Iu. M. Shokal'skiĭ, ego zhizn' i deiatel' nost' (k stoletiiu so dnia rozhdeniia).** [I. M. Shokal'skiĭ, his life and activities: centennial of his birth.] Moscow, Izdatvo "Znanie," **1957.** 21 p. port, 10 refs. (*Vsesoiuznoe Obshchestvo po Rasprostraneniiu Politicheskikh i Nauchnykh Znanii*, Moscow, Ser. 3, No. 48, **1956**). **DLC** (GC30.S48O7)—A biographical sketch and an outline of the scientific activity of the eminent oceanographer, honorary member of the Academy of Sciences of the U.S.S.R. is presented on the occasion of the centennial of his birth (1856–1940). Although a geographer, SHOKAL'SKIĬ, was closely associated during his lifetime with meteorology and climatology. After graduation from the Naval Academy he began to work in 1881 in the Main Geophysical Observatory as chief of the section of Maritime Meteorology. In 1883 he became a member of Voeikov's Meteorological Commission and from 1891 for 40 years was an editor of the *Meteorological Bulletin.* He took an active part in the organization of the network of maritime hydrometeorological stations and the publication of the results of their observations. His published works number 1349 including 65 books (47 in Russian and 18 in foreign languages.) *Subject Headings:* **1. Biography of I. M. Shokal'skiĭ 2. Shokal'skiĭ, I. M.**—*A.M.P.*

12.3–40 551.5:92

Voeĭkov, I. D., **Aleksandr Ivanovich Voeĭkov (Lichnye vospominaniia).** [Aleksandr Ivanovich Voeĭkov (personal recollections.] *Meteorologiia i Gidrologiia*, Leningrad, No. 12:15–22, Dec. **1958. DLC**—This is a personal memoir of A. I. VOEĬKOV, the great Russian climatologist, by his sole surviving nephew. VOEĬKOV's early life, his education, his family background, and his personal characteristics are described. The account is more concerned with VOEĬKOV as a human being than as a scientist. *Subject Headings:* **1. Biography of Aleksandr Ivanovich Voeĭkov 2. Voeĭkov, A. I.**—*I.L.D.*

12.3–41 551.5:92

Normand, Sir Charles, **[Obituary of] Sir Gilbert Walker.** *Nature,* London, 182(4651): 1706, Dec. 20, **1958. DWB, DLC**—Sir Gilbert Walker, aged 90, died on Nov. 4, 1958. His name had been an outstanding one in meteorological circles for half a century. Following his graduation from Trinity College, Cambridge, in 1889, he was elected to a fellowship and later to a lectureship at Trinity. In 1903 WALKER became director-general of observatories in India. Here he became deeply interested in the problem of monsoon rainfall forecasting. In 1924 he retired from India, and became professor of meteorology at the Imperial College of Science and Technology, London. He was elected a Fellow of the Royal Society for original work in dynamics and electromagnetism before he turned his attention to meteorology. *Subject Headings:* **Obituary of Sir Gilbert Walker 2. Walker, Sir Gilbert.**—*M.L.R.*

12.3–42 551.5:551.46:92

Wood, Walter A., **George Hubert Wilkins [in memoriam].** *Geographical Review,* N. Y., 49(3):410–416, July **1959.** photo. **DWB, DLC**—GEORGE HUBERT WILKINS, engineer and scientist, was born Oct. 31, 1888 at Mount Bryan East, South Australia. His achievements in the study of snow and ice in the Arctic and Antarctic, even before World War I, are reviewed. During his expeditions, meteorological, tidal and oceanographic records were kept. Details of his achievements during the many expeditions he led to the Arctic and Antarctic regions are covered. The American Geographic Society presented him with the Samuel Finley Morse Medal in 1928. He died on Dec. 1, 1958. *Subject Headings:* **1. Obituary of George Hubert Wilkins 2. Wilkins, George Hubert.**—*N.N.*

## BIBLIOGRAPHY

*See:* **Bibliog. of aviation med., 12.3–2.**

# B. APPLICATIONS

## B1. AERONAUTICS

*See also:* **Aviation med.**, 12.3–2; **Vertical gust velocity** (Dubov), 12.3–226; **Visibility measurement** (Früngel), 12.3–237; **Airport visibility** (Stevens et al.), 12.3–238; **Isentropic thermal shear in met. navigation** (Partl), 12.3–336; **Aircraft damage by raindrops and hail** (Jones), 12.3–404.

12.3–43 **551.509.52**:551.557(73)

§Sorenson, John E. (*Research Meteorologist, Office of Vice President-Flying*), **Forecasting winds aloft, Pt. 1. Use of the 700 mb chart.** *United Air Lines, Denver, Colo., UAL Meteorology Circular*, No. 46, Feb. 1, **1959.** 38 p. 37 figs., 5 refs. **DWB**—Discussion with synoptic and schematic examples, of importance of 700 mb level in atmospheric circulation and weather forecasting winds aloft at 18,000–25,000 ft. Types of transitions involving 1) steady state, 2) induced troughs, 3) tilted ridges and troughs, 4) mechanism for cut-off low, 5) decreasing winds, 6) increasing winds, 7) trends to high index. The important trends in upstream (in the case of the U. S., the eastern Pacific and western states) pressure and temperature fields at 700 mb as representative of the mean conditions in the lower troposphere which affect later developments in the higher levels, is emphasized and clearly demonstrated. *Subject Headings:* **1. Upper air wind forecasting, United States 2. 700 mb chart transitions 3. U. S.** —*M.R.*

12.3–44 **551.509.32**:551.510.528

†Sorenson, J. E. (*United Air Lines, Inc. Flight Dept.*), **Forecasting winds aloft, Pt. 2. Forecasting near the tropopause.** *United Air Lines, Inc., UAL Meteorology Circular* No. 47, Aug. 15, **1959.** 57 p. 32 figs., 23 refs. **DWB** (M:629.13 U58mc)—Describes the problem of forecasting near the tropopause. "An analytical study of the isotherm contour pattern at 700, 500, 400 mb will yield a fairly complete understanding of the causes of wind variation from level to level. The thermal wind tropopause is a continuous single valued surface. In order to forecast the tropopause 1) compare 500 mb isotherms to a tropopause chart, 2) advect the 500 mb isotherms by using 700 mb winds, 3) associate the 500 mb isotherms with the current correlations, 4) compare the values obtained to extrapolation of heights from current and past tropopause charts." *Subject Heading:* **1. Tropopause forecasting.**—*From author's abstract.*

12.3–45 **551.509.5**:551.556:629.135.2

*Pike, E. W.; Smith, H. E. and Evans, C., **Comet III paper operations (London-New York): interim report on period March 1–May 31, 1954, inclusive.** British Overseas Airways Corporation, Operations Dept., June 30, **1954.** 5 p. 6 figs., tables. Also: **Second interim report, June 1–Aug. 31, 1954, inclusive.** Nov. 1, **1954.** 3 p. 6 figs., table. **DWB** (M:629.13 B862co)—In order to evaluate the effects of winds and forecast errors on loads and flight time of 2-stage Comet III aircraft crossing from London to New York, via Keflavik, Goose Bay or Gander, "paper" flight plans and flights were made for 3 months, March 1–May 31, 1954. The second report gives results for June 1 to Aug. 31, 1954 clearly summarized in text and graphic form. The mean head wind component was 14 km for the second 3 month period; the maximum 40 km and the estimated forecast error gave an additional 330 lbs of fuel or mean delay of 3 min in flight (maximum increase was 22 min or 770 lbs of fuel). Effect of worsening or improvement of landing conditions was also analyzed. *Subject Headings:* **1. Comet trans-Atlantic flight plans 2. Forecast error effects in jet flights.**—*M.R.*

12.3–46 526.869:551.5:629.13(93/99)

Larsen, John (*Flight Navigator, Trans World Airlines*), **Weather information as an air navigation aid on the Polar route.** *Navigation*, Los Angeles, 6(2):86–88, Summer **1958. DLC**—The Lambert map projections of 1:125,500,000 scale as used by the meteorologists are rapidly becoming obsolete by the increased transpolar air flights. The change to curved surface charts for analyzing the 20,000,000 sq mi area extending into high latitudes will be difficult at first for the meteorologist, but will be amply compensated by greater accuracy and flexibility for large-scale forecasting. Distortion in scale and meridian convergence and correction factors are eliminated by using these curved transparent plastic charts in true perspective, leased on the oblique Mercator projection. Any data desired can be attached or removed easily from the sub-surface of the transparent sphere section which covers 90° long. from the Equator to the pole, with each fifth meridian and parallel indicated. Flanged edges provide interconnection between additional sections. *Subject Headings:* **1. Air navigation aids 2. Graphical weather data computers 3. Flight forecasts computers.**—*W.N.*

12.3–47 629.13:621.45:534.2:551.510.536

†Patterson, G. N. (*Inst. of Aerophysics, Toronto Univ.*), **Aerophysical problems of flight at extreme altitudes and speeds.** *Canadian Aeronautical Journal*, Ottawa, 4(1):3–10, Jan. 1958. 7 figs., 25 refs., port. and vita of author. **Pt. 2,** *Ibid.*, 4(2):39–47, Feb. **1958.** figs. 8–15, refs. 26–62, eqs. **Pt. 3,** *Ibid.*, 4(3):79–85, March **1958.** figs. 16–23, refs. 63–98. **DLC**—In these articles, which are devoted mainly to the effects of flight at high Mach numbers, dissociation and high temperatures and other boundary layer problems of supersonic flight at high altitudes, there are a number of charts showing the ambient conditions up to 125 or 160 km (flight corridors, temperature, pressure, mean free path, performance) and basic regions up to 900 km. These conditions are discussed in the early part of the paper. *Subject Headings:* **1. High altitude flight 2. Supersonic flights 3. Boundary layer problems.**—*M.R.*

12.3–48 551.574.7:629.13

Perkins, Porter J. (*Lewis Flight Propulsion Lab., Cleveland*), **Icing frequencies experienced during climb and descent by fighter-interceptor aircraft.** *U. S. National Advisory Committee for Aeronautics, Technical Note*, 4314, July **1958.** 30 p. 11 figs., 2 tables, 6 refs., eqs. **DWB, DLC**—Relative frequencies of occurrence and severity of icing cloud layers encountered up to an altitude of 30,000 ft are presented. Jet fighters on routine operations of the Air Defense Command (USAF) near Duluth, Minnesota, and Seattle, Washington, were equipped with icing meters for 1 year. Icing occurred on approximately 5% of the flights, with ice-accretion thickness averaging less than $\frac{1}{32}$ in. on a small sensing probe. Probabilities of icing severity (including average liquid-water content and maximum ice accretion) were calculated using earlier data measured in icing clouds. *Subject Heading:* **1. Icing of aircraft frequencies.**—*Author's abstract.*

12.3–49 551.578.71:629.13

Appleman, Herbert S. and Lehr, Paul E. (*both, Air Weather Service*), **Occurrence of damaging hail at high altitudes.** *Institute of the Aeronautical Sciences, IAS Paper*, No. 60-3, **1960.** 6 p. 5 figs., ref. **DWB** (M:629.13 I59pa)—The large-droplet theory of hail formation is briefly reviewed. Then, making use of the Air Force hail-incident reports, a slide is presented showing the frequency of hail encounters as a function of altitude, from the surface to 45,000 ft. Next, the data are subdivided into low-altitude (below 25,000 ft) and high-altitude (25,000 ft and above) cases, and the relationship studied of hail frequency as a function of time of day and time of year. It is found that high-altitude hail encounters reach their peak frequency later in the day and later in the year than do the low-altitude encounters. Finally, a study of the comparative heights of hail encounters over a period of years reveals that a larger percentage of the encounters is occurring above 25,000 ft than formerly. *Subject Headings:* **1. Hail formation 2. Hail damaging occurrence at high altitudes 3. Aircraft encounters with hail.**—*Authors' abstract.*

12.3–50 551.578.1:551.501.81:629.13

Battan, Louis J. (*Inst. of Atmospheric Physics, Univ. of Arizona*), **Observations of hail storms by means of airborne radar.** *Institute of the Aeronautical Sciences, IAS Paper*, No. 60-1, **1960.** (8 p.) 4 figs., 5 refs. **DWB** (M:629.13 I59pa)—The purpose of this paper is to review the results on the relationship of radar echo properties and hail occurrence, and based on those results to propose means to reduce the hazards of hailstorms. "Hail and radar observations by Donaldson and Douglas has shown that the greater the altitude of thunderstorm echo tops the higher the probability of hail. A pronounced increase in the probability of medium hail occurs when echo tops extend above 30,000 ft. Donaldson has also shown that as the maximum echo intensity increases the probability of hail and of tornadoes increases It is urged that present air-borne radar sets be modified to permit vertical scanning in the forward sector, to permit the pilot to obtain cloud height information. If the radar system also incorporates isoecho contour circuitry, information on thunderstorm echo heights and intensity can be read directly off a radarscope and be of immediate use to the pilot." Diagrams illustrate per cent of echoes with hail in relation to altitude and temperature of echo top and curves of likelihood of hail, derived from DONALDSON's observations in the Boston area and DOUGLAS' observations in Alberta. A photostat presents an example of a thunderstorm on a vertically scanning 3-cm radar set. *Subject Headings:* **1. Hailstorm observation techniques 2. Radar echoes from hail.**—*O.T.*

12.3–51 551.524.7:629.13

Corwin, H. G. and Frost, E. S., **On the evaluation of in-flight temperature reports.** *Trans World Airlines, Inc., TWA Meteorological Technical Bulletin,* No. 58-1, Jan. 13, **1958.** 6 p 2 figs., 4 refs., 11 eqs. **DWB**—This paper attempts to delineate the errors involved in temperature reports from aircraft in clear air versus cloud or precipitation. The compressiona warming as a result of the speed of the aircraft is discussed in relation to the evaporationa cooling experienced in cloud, and a method of estimating the extent of this effect is proposed It is emphasized that the magnitude of this error, which is already significant, may be increased beyond usable proportions with the introduction of high-speed jet aircraft in the near future *Subject Headings:* **1. In-flight temperature reports 2. Aircraft effects on upper air temperature measurement.**—*Authors' abstract.*

12.3–52 551.524.1:551.584.5:629.139

Glaser, Arnold H., **The temperature above an airport runway on a hot day: moist climate** Texas Agricultural and Mechanical College. Dept. of Oceanography, Contract AF 19(604)-997, Scientific Report No. 4, Oct. **1955.** 12 p. 19 figs., 3 refs.—Hot weather temperature measurements made over concrete runways surrounded by lush vegetation at Houma, La. show that the air above the runways is at best heated but slightly above temperatures over the surroundings, and in some cases is cooler than the air over the surroundings. This behavior is the result of the combined effects of acceleration of air over the runway, causing descent of cooler air; somewhat higher albedo of the runway; greater effective heat capacity in the runway, and smooth runway surface, slowing turbulent heat transfer. The latent heat flux from the lush vegetation seemed little greater than that observed in a drier climate, presumably because of high atmospheric moisture. Temperature fluctuations over the runway proved to be largely contained in eddy sizes of a few tens of meters. Maximum peak-to-trough fluctuations observed at one meter height did not exceed 5°C, and were mostly encompassed within a range of 3°C. Larger scale fluctuations rarely exceeded 2°C. *Subject Headings:* **1. Airport runways temperature 2. Microclimate of runways.**—*A.A.*

## B2. MARINE METEOROLOGY

*See also:* **Navigation in ice,** 12.3–200; **Ocean weather stations** (Powell), 12.3–232; **Wind regime, Barents and Kara Seas** (Antipova), 12.3–247.

12.3–53 551.5:551.46:629.12

James, Richard W. (*Div. Oceanog., U. S. Navy Hydrographic Office*), **Weather routing of ships.** *Mariner's Weather Log,* Wash., D. C., 3(2):31–34, March **1959.** 4 figs. **DWB**—Since Oct. 1956 the U. S. Navy Hydrographic Office has conducted a ship routing program, using ships of the Military Sea Transportation Service (MSTS). The preparation of an optimum chart requires the use of: prognostic wave charts, ship performance graphs and ship-speed charts. A brief description of each of these is given. Finally, the author discusses the use of these parameters in the calculation of an optimum track. *Subject Headings:* **1. Ship routing programs 2. Optimum ship routing.**—*M.L.R.*

12.3–54 551.5:656.61

Hanssen, George (*Div. Oceanog., U. S. Navy Hydrographic Off.*), **Preliminary evaluation of the U. S. Navy Hydrographic Office optimum ship routing program.** *Mariners Weather Log,* Wash., D. C., 3(5):173–175, Sept. **1959.** fig. **DWB**—The following methods as developed by R. James are discussed and evaluated: 1) control vessels, 2) theoretical control vessels, 3) estimated vs. actual time of arrival, 4) statistical data, 5) distance and fuel consumption, and 6) damage to vessel or cargo and passenger comfort. The successful results of a 2½ year test period which ended May 1957, during which 22 Atlantic and 10 Pacific vessels operated by MSTS were experimentally directed over 32 routes led to an extension of the program to include over 900 vessels. A value of approximately 14.5 hr per crossing was saved; the value of wave forecast to route selection proved most representative. *Subject Headings:* **1. Ship routing programs 2. Optimum ship routing.**—*W.N.*

12.3–55 551.574.42:629.12(268)

**Research on anti-icing precautions for ships.** *Polar Record*, Cambridge, 9(58):36–39, Jan. **1958.** (Summarized from an unpublished report **Trawler-icing research,** issued by the Council of the British Ship-building Res. Assoc., London, **1957** (Report No. 221), and information from Messrs. Cook, Walton and Gemmell Lts., Hull.) **DLC** –Icing of ships at air temperatures below the freezing point of sea water but above 0°F, when only small dry ice crystals are found, is a serious danger to ships sailing in Arctic waters. Recent losses of trawlers which capsized due to loss in metacentric height instigated a series of model tests, the results of which are briefly reported. The direction of the wind toward the ship was found to be an important factor. New ships are being designed, counteracting the danger by changing the overstructure. *Subject Headings:* **1. Icing of ships 2. Arctic navigation 3. Arctic.** —*A.A.*

12.3–56 551.501:551.321:629.135.2(268)

French, Howard V. (*U. S. Navy Hydrographic Office, Wash., D. C.*), **Aerial ice observing and reporting.** *National Research Council, Wash., D. C., Publication*, No. 598:69–75, Dec. **1958.** 4 figs., table, 4 refs. **DLC, DWB** (551.311 A675pr)—The strategic and economic potential of the North American Arctic has been widely recognized; however, exploitation of this vast area of snow, ice and permafrost will depend to a great extent upon solving the difficult and diverse problems of logistics. The purpose of this paper is threefold: (1) to briefly describe aerial ice reconnaissance which supports logistic sealift resupply operations of Arctic bases and weather stations, (2) to discuss the most important observable ice features, and (3) to point out the limitations involved in present methods of ice observing and reporting techniques and to recommend certain beneficial changes. *Subject Headings:* **1. Aerial ice reconnaissance 2. Ice observation techniques 3. Arctic resupply operations 4. Arctic.** —*Author's abstract.*

12.3–57 551.5:361.9(521.43)

Tsunoda, T. and Takehana, M., **Shipwrecks at the coast of Ishikawa Prefecture, Pt. 1.** *Journal of Meteorological Research*, Tokyo, 10(2):128–133, Feb. **1958.** 7 figs., 11 tables. In Japanese. **DWB, DLC**—Ishikawa Prefecture, a conspicuous area of shipwrecks, has a sinuous 600 km coast line. Shipwrecks were classified under two categories: one subjective and the other is objective. During the period 1952–56 there were 286 typical accidents, most of which were caused by weather phenomena. The authors analyzed statistically the number of cyclones, fronts, typhoons, migratory anticyclones, monsoons and seasonal causes; in order, from the highest to the lowest frequency. Figures showed types of damage, size of ships, wind direction and speed. *Subject Headings:* **1. Marine disasters 2. Weather effects on marine disasters 3. Ishikawa Prefecture, Japan.**—*K.C.*

## B3. AGRICULTURE

*See also:* **$CO_2$ flux over a sugar beet field** (Monteith, Szeica), 12.3-260; **Topoclimat. study for land reclamation** (Schöne), 12.3–430.

12.3–58 551.5:63:06.045

World Meteorological Organization. Commission for Agricultural Meteorology, **Abridged Final Report, Second Session, Warsaw, Sept. 29–Oct. 17, 1958.** *World Meteorological Or-*

*ganization*, [*Publication*], *WMO*, No. 82.RP.35, **1958.** 54 p. **DWB** (M(06) W927p)—Standard WMO report on Warsaw meeting attended by 51 delegates from 33 countries and 3 international organizations. Two working committees were established, one for practical and administrative matters and one for theoretical and scientific matters. Ten scientific papers were read at the first meeting (Oct. 8) and 6 at the second (Oct. 14) general session. Exhibits dealing with various aspects of agricultural meteorology were provided. P. M. AUSTIN BOURKE of Ireland was elected President vice J. J. BURGOS, and M. S. KULIK of U.S.S.R., Vice-President. Twelve resolutions and 8 recommendations covering a broad range of subject matter are given in detail. Appended is a draft of the contents of the **Guide to Agricultural Meteorology Practices,** and notes on preparation of the guide, a syllabus for instruction in agrometeorology at the university level, etc. *Subject Headings:* **1. WMO. Agricultural Meteorology Commission reports 2. Warsaw meeting of Commission for Agricultural Meteorology 3. Warsaw, Poland.**—*M.R.*

12.3–59 551.5:63:061.3

Kulik, M. S., **Vtoraia sessiia Komissii po sel'skokhoziaistvennoĭ meteorologii Vsemirnoĭ meteorologicheskoĭ organizatsii.** [Second Session of the Commission on Agricultural Meteorology of the WMO.] *Meteorologiia i Gidrologiia*, Leningrad, No. 2:67–69, Feb. **1959. DWB, DLC**—A brief account of the history of the International Agrometeorological Organization and of the first session of the Committee for Agricultural Meteorology of the WMO is followed by a report of the proceedings of the second session held in Warsaw Sept. 29–Oct. 17, 1958. A detailed account is given of the methods and instrumentation developed in the U. S. for measuring soil moisture content and soil density under field conditions by means of radioactive isotopes. Mention is made of A. L. DANILIN'S method for measuring soil moisture by means of gamma rays, of SHOKHIN'S thermometer probe, of C. W. THORNTHWAITE'S method for measuring evaporation, of an apparatus for measuring the movement of soil layers as they freeze and thaw, developed by A. S. BATS (Poland), classification of climates for agricultural purposes, etc. *Subject Headings:* **1. Agricultural meteorology 2. WMO. Agricultural Meteorology Commission.**—*I.L.D.*

12.3–60 551.5:63(94)

Prescott, J. A. (*Dir., Waite Agric. Res. Inst., Adelaide*), **Agricultural climatology in Australia.** *Pan Indian Ocean Science Congress, Aug. 1954, Perth, Western Australia, Proceedings of Section A, Physical Sciences*, (pub. **1958?**). p. 47–51. 12 refs. **DWB** (506.35 P187pr)—In order to define the nature of physical environment of Australia, a committee has been set up to study the wheat growing areas of western Australia, the frost incidence, the probability of drought in western New South Wales and the efficiency of rainfall in western Queensland. The Commonwealth Meteorology Bureau provides the basic service on which agricultural climatology is based. Notable work done so far is reviewed and 53 resprint papers from the Waite Institute that deal with some aspect of climatology are listed. *Subject Headings:* **1. Agricultural climatology of Australia 2. Australia.**—*N.N.*

12.3–61 551.515.2:633.6(698.2)

Swan, A. D., **The effects of tropical cyclones on the sugar crop in Mauritius.** *Revue Agricole et Sucrière de l'Ile Maurice*, Port-Louis, 39(2):57–60, March/April **1960.** fig., 2 tables, ref. **DA**—This paper provides another method to aid in an accurate assessment of the normal annual loss due to the effects of cyclones on sugar yield, in particular how the damage in any one year, when two or more cyclones occurred, is made up of the individual effects of the cyclones taken separately. Taking as a basis the variation of the frequency of cyclones through the year, the author studies the possibility of diminishing the damage by modifying the vegetation period of the sugar crop. On the other hand, when examining the years which suffered from two or more cyclones during the period 1876–1945 one notices that in any of these years the total damage is approximately the same as the sum of the damage which would have been caused by each cyclone in a single cyclone year. *Subject Headings:* **1. Tropical cyclone damage to sugar crops 2. Sugarcane cultivation 3. Mauritius.**—*A.V.*

12.3–62 551.586:633.51:667.35

Lord, E. (*British Cotton Industry Res. Assoc., Shirly Inst., Manchester*) and Anthony, K. R. M. (*Empire Cotton Growing Corpor., Aden*), **Effect of exposure to the Aden climate on cotton lint strength.** *Empire Cotton Growing Review*, London, 37(1):10–14, Jan. **1960.** 4 tables, 4 refs. **NNA**—The present investigation was undertaken in Aden to assess the degree of deterioration in cotton fiber strength to be expected, as a result of exposure to weather, when mature bolls remain unpicked on the plants. Two exposure trials were conducted, each from 1 to 16 weeks. The first series commenced at the end of Jan., at the beginning of the normal picking season, which falls in the latter half of the SE monsoon. The second series started on June 1, during the more extreme weather of the Aden summer. Under Aden conditions, damage to fiber is probably the result of both microbiological action and sunlight. Under normal climatic conditions prevailing at picking time the loss in tensile strength of freely exposed material may approach 1% per week. It is likely that the bulk of the crop will average a somewhat smaller effect, and that the drop in average tensile strength will not be appreciable in cotton left unpicked for up to three to four weeks. Nevertheless prolonged field exposure adversely affects other aspects of cotton quality, and also the earlier opened bolls tend to be of higher grade than those opening later. The resultant mixture of various grades resulting from delayed picking leads inevitably to a lower percentage of high grades in the crop. Under summer conditions, deterioration of fully exposed cotton is more rapid, and the drop in fiber strength may approach 2% per week. These latter conditions are not encountered in practice because picking is generally completed before the end of May. *Subject Headings:* **1. Cotton fiber deterioration 2. Weather effects on cotton fiber 3. Aden, Aden Protectorate.**—*A.V.*

12.3–63 551.586:631.417

Kauffmann, Jacques and Boquel, Geneviève, **Influence du thermo et de l'hygropériodisme sur la formation de l'humus. Incidence sur le problème de la conservation de l'humus dans les terres acides sous climat tropical.** [Influence of thermo- and hygro-periodism on humus formation. Incidence on the humus conservation problem in acid soils in tropical climate.] *Académie des Sciences, Paris, Comptes Rendus*, 250(7):1314–1316, Feb. 15, **1960.** fig., 2 refs. **DWB, DLC**—In certain soils and under certain conditions, organic matter is transformed into humus by the action of the microorganisms of the soil. Climatic factors play an important role in the formation of humus, particularly the favorable influence of continental climate with its alternation of moisture and drought. This study is aimed at establishing whether the periodic changes in temperature and moisture are favorable or not to the forming of humus. For this purpose the authors compare the effect of the climatic conditions on various media to a reference medium with constant temperature and moisture. Thermo- and hygro-periodism promote humus conservation in acid media. It is most probable that under tropical climate conditions, the wet seasons (high and constant temperature and humidity lasting for several consecutive months) are a cause, in acid soils, of poor humus fermentation resulting in the formation of unstable pseudo-humus substances. *Subject Headings:* **1. Humus formation 2. Weather effects on humus conservation.**—*A.V.*

12.3–64 551.586:551.521.16:581.14

Wellensiek, S. J., **Does darkness inhibit floral initiation in long day plants?** *Akademie van Wetenschappen te Amsterdam. Afdeeling voor de Wis- en Natuurkundige Wetenschappen, Proceedings, Ser. C, Biological and Medical Sciences*, 63(2):155–158, **1960. DLC, CU, NN**—In earlier experiments by SCHWABE and the author, light was demonstrated to exert an inhibitive action on the initiation of flowers in short day plants. The present paper deals with the problem of whether in long day plants (L.D.P.) darkness retards floral initiation. In the S.D.P. *Arabidopsis thaliana* "Koln," annual *Hyoxyamus niger* and *Silene armeria*, temporary darkness does not exert an inhibitive action on flower buds. In *A. thaliana* the process comes to a standstill or is slowed down appreciably as long as the plant is in darkness, but even this is not the case in the other two species. The difference might be connected with the fact that *A. thaliana* is only a quantitative SDP. *Subject Headings:* **1. Darkness effects on long day plants 2. Flowering of long day plants.**—*A.V.*

12.3–65 551.586:634.8:632.4

Kundert, J., **Auftreten und Bekämpfung der *Rebenperonospora* im Jahre 1959.** [Appearance and protection against *Peronospora* of vines during 1959.] *Schweizerische Zeitschrift für Obst- und Weinbau*, Wädenswill, 69(3):61–66, Feb. 6, **1960.** fig., 3 tables. **DA**—Observations on the appearance of *Peronospora* during the vegetation period 1959 show that the fungus can be formed any time and that the first appearance cannot be determined with certainty because of the climatic differences of the vineyards. Precipitation values above 10 mm are not necessarily a danger to *Peronospora* and periodical cold air invasion even temperatures below 13°C are diminishing the development of fungus more than supposed before. During recent years experience shows that it is not advisable to sprinkle before the first week of June and to sprinkle a second time at the beginning of August. The author mentions some preparations for sprinkling. *Subject Headings:* **1. Weather effects on vineyard disease 2. Peronospora development 3. Viticulture.**—*A.V.*

12.3–66 551.556.2

Schultz, H. B. and Kelly, C. F. (*both, Univ. of Calif., Davis*), **Studies on wind protection efficiency of slatted fence windbreakers.** *California Agriculture*, Berkeley, 14(3):3, 11, April **1960.** 3 figs. **DA, DWB**—Account of full-scale tests made at Davis, Calif., on the efficiency of slatted fence windbreakers in lowering the wind velocity. The authors experimented and compared the efficiency of fences in both vertical and tilted positions. It appeared that any possible advantage from tilting the windbreak was cancelled by a loss in height. The authors investigated further the influence of different percents of fence perviousness which appeared to be of little importance except for short distances behind the fence. The results of the various experiments are presented in graphs and succinct conclusions are drawn. *Subject Headings:* **1. Windbreak effectiveness 2. Davis, Calif.**—*A.V.*

## B4. MEDICINE

12.3–67 551.524:551.571:616.932

McGuire, James K. (*U. S. Weather Bureau, N. Y.*), **Climate and cholera.** *New York Academy of Sciences, Transactions*, Ser. 2, 21(6):541–550, April **1959.** fig., table, 21 refs. **DLC**—Epidemics of cholera panicked the residents of New York in 1832, 1834, 1849, 1854 and 1866, when about 4000, 1000, 6000, 2000 and 2000, respectively, died in New York and Brooklyn. In 1892 an epidemic in Asia and Europe was prevented from spreading in the U. S., only 9 cases ending fatally although 44 deaths occurred in quarantine (as 8 infected vessels arrived in New York harbor). The then current and present ideas of climatic influences are discussed and data from June–Nov. 1954 (temperature, dew point, rainfall and cholera deaths) for weeks and months in that period are shown graphically and in a table. A rough correlation is shown between weekly mean temperature and dew point and cholera deaths, though no valid threshold values of either temperature or dew point (absolute humidity) can be found. Experience in India is also cited. *Subject Headings:* **1. Climate and disease 2. Temperature and humidity effects on cholera 3. Cholera epidemiology 4. New York, N. Y.**—*M.R.*

12.3–68 551.586:616.72

*Whiten, A. J. (*Gt. Britain*), **Weather sensitivity of rheumatism.** *International Journal of Bioclimatology and Biometeorology*, Leiden, Vol. 1 (Pt. 4, Human Bioclimatology), **1957.** 19 p. numerous tables. Also issued in *Weather*, London, 13(2):57–61, Feb. **1958.** 3 tables, 4 refs. **DWB**—The author analyzes the relationship between barometric pressure and precipitation and the pain sensations of 117 ambulatory patients suffering from various forms of rheumatism. A detailed account of the means of collecting and summarizing the data is given. The statistical analysis involved the computation frequencies, $x^2$ and $\Sigma(\partial^2/e)$ for each rheumatic disease and the results are given in tables. The weather reaction of individuals are as follows: In the case of fibrositis, patients suffer after pressure has been low and find relief after high pressure. There is no effect from imminent pressure changes. Rain is felt immediately after it falls but relief follows when it is down. Neuritis does not seem to be affected by static pressure at any particular time, but there appears to be a marked reaction during rising or falling pressure. Both past and future rainfall seems to cause painful reactions but there is no pain when rain is actually falling. In the case of rheumatoid-arthritis, there is, in general, trouble shortly before low pressure with relief before high. There is no evidence of reaction to rainfall. Osteoarthritis does not appear to be influenced by static pressure although there is an indication of a sharp painful reaction after and during falling pressure. Phantom pains in amputated members seem to be very sensitive to any pressure other than normal. *Subject Headings:* **1. Weather sensitivity 2. Rheumatism.**—*I.L.D.*

12.3–69 551.586:612.5

†Goromosov, M. S., **Kompleksnye pokazateli vliianiia na organizm razlichnykh meteorologicheskikh faktorov i ikh kritika.** [Critical review of complex indices expressing the effect of various meteorological elements upon the organism.] *Gigiena i Sanitariia*, Moscow, 23(7):66–71, July **1958**. 25 refs. **DLC**—A critical review of the various attempts made to find a single numerical index to express the effect of individual or combined meteorological elements upon the heat balance of the body. The author examines: 1) the validity of the effective temperature index, the manner of its derivation, its critique by VERNON and its modification by BEDFORD; 2) the equivalent temperature scale developed by A. F. DUFTON; 3) the operative temperature concept of WINSLOW, HERRINGTON and GAGGE; 4) the index of physiological strain proposed by SID ROBINSON, TURREL and GERKING and 5) the thermal acceptance ratio developed by I. H. PLUMMER and MARGARET C. IONIDES in the Office of the Quartermaster General. Also Soviet work on this problem is mentioned. *Subject Headings:* **1. Weather effects on body heat balance 2. Body heat balance indexes.** -*I.L.D.*

12.3–70 551.521.17:551.586:612.7(048)

Schulze, Rudolf, **Zur biologischen Wirkung der langwelligen Ultraviolettstrahlung in den Alpen.** [The biological effect of long wave ultraviolet radiation in the Alps (Summary only).] *Germany. Deutscher Wetterdienst, Berichte*, 8(54):94, **1959**. **DWB, DLC**—At the Hamburg Meteorological Observatory the Larchê sphere is used for the physical measurement of long wave ultraviolet radiation. For determining the biological action of the rays the threshold reaction time of the direct pigmentation of the human skin is used. Both experimental series have shown similar dependence on solar altitude for a transmissionfac tor of $q = 0.6$. Recent physical measurements on high mountains on selected days has confirmed this result both for physical measurements and for the threshold reaction of the skin. Accordingly the radiation intensities and daily totals of ultra wave radiations can be given for all localities of the high mountains. *Subject Headings:* **1. Ultraviolet radiation measurement 2. Biological effects of long wave ultraviolet radiation 3. Alps.**—*I.L.D.*

12.3–71 551.586:612.5:612.79

Heerd, E. (*Germany*), **Die Abhängigkeit der Auslöseschwelle des thermischen Schwitzens beim Menschen von verschiedenen Umweltbedingungen.** [Dependence of the threshold of the onset of thermal sweating in man under different ambient conditions.] *International Journal of Bioclimatology and Biometeorology*, Leiden, Vol. 1 (Pt. 4, Human Bioclimatology), **1957**. 3 p. **DWB**—An experimental study was carried out on the influence of different atmospheric conditions and types of clothing upon the threshold of thermal sweating. The initial physiological values (skin and rectal temperatures) were measured at the neutral temperature of 28°C and then at 40–45°C with relative humidities of 25 and 90%. Sweating began at a rectal temperature of 36.5°C with a skin temperature of 36.2°C, and at a rectal temperature of 37.2°C with a skin temperature of 34.8°C. In the experiments 37.3°C was the highest rectal temperature attained by the resting individual without thermal sweating. It is concluded that the threshold of thermal sweating in man is influenced by the skin temperature as well as by the rectal temperature; that at high rectal temperatures sweating occurs at lower skin temperature and vice versa; that environmental factors such as clothing, rate of rise of atmospheric temperature and humidity mediate through the skin temperature their effect on the threshold of thermal sweating. *Subject Headings:* **1. Sweating 2. Body temperatures 3. Skin temperatures 4. Climatic effects on sweating.**—*I.L.D.*

12.3–72 551.586:615.834 551.585

Paszyński, J. (*Poland*), **Klimatische Gliederung der Umgebung von Kurort Ciechocinek.** [Climatic classification of the area surrounding the health resort at Ciechocinek.] *International Journal of Bioclimatology and Biometeorology*, Leiden, Vol. 1 (Pt. 4, Human Bioclimatology), **1957.** 2 p. **DWB**—On the basis of the local climatic studies (1954–55) involving measurements of the meteorological variables at heights of 0.5 m to 1.5 or 2.0 m, the climate of Ciechocinck, a resort on the lower Vistula, was classified with seven microclimatic zones: 1) areas with high wind velocity and high relative humidity immediately influenced by the Vistula; 2) local cold air lakes during cold nights, more subject to frost than the other zones; 3) areas with a high ground water level—relatively high relative humidity; 4) low relative humidity on bright days, rising temperature as compared with area 3; 5) slopes with northern declivities with reduced insolation; 6) relatively dry uplands—smaller temperature variations as compared with the Ciechocinek depression, higher wind velocity; and 7) dense terraces and pine forests—highest air temperatures and very low relative humidity on bright sunny days. *Subject Headings:* **1. Resort climatology 2. Health resorts 3. Climatic classifications 4. Ciechocinek, Poland.**—*I.L.D.*

12.3–73 551.586:612.5

Iampietro, P. F.; Buskirk, Elsworth R. and Bass, David E., **Effects of food, climate, and exercise on rectal temperature during the day.** *U. S. Quartermaster Research and Engineering Center, Natick, Mass. Environmental Protection Research Div., Technical Report*, EP-76, Dec. **1957.** 5 p. 2 figs., table, 11 refs. **DWB** (M86 U585t)—A series of experiments was performed to determine the effect of climate, food intake, and activity level on the diurnal pattern of rectal temperature ($T_r$) from 8 a.m. to 8 p.m. The results indicate that living in diverse climates has little or no effect on the diurnal pattern of $T_r$. Activity level, when food intake was adequate, did not alter the pattern. Fasting, with no exercise, reduced the diurnal elevation of rectal temperature to one-half the "normal" elevation. During fasting with exercise the rectal temperature at 8 p.m. was the same as the value at 8 a.m. (i.e., no diurnal increase was evident). Thus, the major portion of the diurnal change occurring between 8 a.m. and 8 p.m. was associated with the ingestion of food. *Subject Headings:* **1. Weather effects on temperature 2. Rectal temperatures.**—*Authors' abstract.*

## B5. RADIOACTIVITY

*See also:* **Nuclear explosions for peacetime use** (Fiebiger), 12.3–38; **Radioactive iodine deposition** (Chamberlain), 12.3–267; **Radioactive iodine diffusion** (Crabtree), 12.3–268; **Radioactive fallout measurements** (Eisenbud, Harley), 12.3–269; **Fallout measurement techniques** (Farlow), 12.3–270; **Long range travel of radioactive clouds** (Stewart, Crooks), 12.3–271.

12.3–74 551.510.72:061.3

National Association of Manufacturers, **Industrial nuclear development: a challenge to the States. Proceedings of a Conference sponsored by the Nuclear Energy and Employee Health and Benefits Committees of the National Association of Manufacturers and by the National Industrial Council, New York, May 21–22, 1958.** Pub. by the Association, **1958.** 64 p.—The conclusion of the Conference was radiation safety first, atomic application second. Hazards (real and imaginary), public health, labor protection, legislation, etc. and, above all, preventive measures, are discussed. The prevention of oceanic contamination by atomic waste is not so well advanced as is that of fresh water. The fall-out problem will be the subject of a second series of hearings by the Joint Committee (AEC) of the Congress. This will involve the nonuniformity of stratospheric fall-out and the effect of carbon-14. The Conference was divided into three sessions where 18 papers were read and these are included in this volume. *Subject Headings:* **1. Radioactivity conferences 2. Radioactive fallout hazards.**—*W.N.*

12.3–75 551.510.72:614.8

Predmerszky, Tibor, **A légkör radioaktív szennyeződésének közegészségügyi vonatkozásai.** [Public health aspect of radioactive pollution of the atmosphere.] *Időjárás*, Budapest, 62(5):275–283, Sept./Oct. **1958.** 6 figs., 8 tables, 2 eqs. Hungarian and English summaries p. 275. **DLC**—The author discusses public sanitary effects of artificial radioactive pollution of the atmosphere, biological effects of radioactive radiation and the units applied in anti-radiation defense. Increase of atmospheric pollution caused by nuclear bombs may give rise to genetic damage to future generations. This is why systematic measurement of the radioactivity of the air, precipitation and surface waters is absolutely indispensable from the point of view of public hygiene. *Subject Headings:* **1. Radioactivity in the atmosphere 2. Radioactive fallout 3. Public health.**—*Author's abstract.*

12.3–76 551.510.721

Machta, Lester and Nagler, Kenneth M. (*both, U. S. W. B., Wash., D. C.*), **Meteorology: fallout and weathering.** (In: U. S. Atomic Energy Commission, **The shorter-term biological hazards of a fallout field [Symposium], Wash., D. C., Dec. 1956.** pub. **1958.** p. 3 11. 6 figs.) **DWB** (M94.14 U581sy)—The problems of fallout prediction, considering the effect of gravity, wind and rain scavenging, and of the weathering of deposited radioactive particles are discussed. Three types of weathering are considered qualitatively: the washing away, blowing away and covering of particles. It is found that most radioactive particles are of a size easily moved by moderate winds. Considering the great variability of rainfall and wind the authors caution against the use of an average weathering effect. *Subject Headings:* **1. Radioactive fallout forecasting 2. Radioactive fallout weathering.**—*G.T.*

12.3–77 551.510.721:341.67

Pauling, Linus and Teller, Edward, **Fallout and disarmament.** *Daedalus*, Boston, Spring, **1958.** p. 147–163. **DWB.** (This issue of *Daedalus* issued as Vol. 87, No. 2 of *Proceedings of the American Academy of Arts and Sciences.*)—The extent of the fallout danger is discussed, with L. PAULING emphasizing its magnitude ("the man who gives the order to test a single large superbomb with high fission yield is dooming 15,000 seriously defective children to be born in later generations"), and E. TELLER urging continuation of nuclear testing. An appeal prepared by PAULING and signed by over 9000 scientists from all countries, and a subsequent attack on this petition in *LIFE* (based upon statements by TELLER) serve as background to the debate. *Subject Headings:* **1. Radioactive fallout effects 2. Disarmament.**—*G.T.*

12.3–78 551.510.721:551.510.42:523.161

Pettersson, Hans (*Geophysical Dept., Univ. of Hawaii*), **Rate of accretion of cosmic dust on the earth.** *Nature*, London, 181(4605):330, Feb. 1, **1958.** 3 refs. **DWB, DLC**—Cosmic dust was collected at Mauna Loa Observatory (11,000 ft), and from the summit of Mt. Haleakala on Maui (10,000 ft), and analyzed for radioactive fallout products, strontium 89 and strontium 90. An analysis of the filters showed collections of nickel far in excess of any possible contamination from terrestrial sources; the rate to iron ratio was 0.9; the cobalt to iron ratio was 0.2. The weight of cosmic dust suspended in the atmosphere to the 100 kms level is estimated at 28.6 million metric tons. The annual measurement of cosmic dust on the earth is computed by assuming a probable rate of descent from the 100 km to the 3 km level of about 2 years. With this rate of descent the cosmic dust suspended in the atmosphere should be measured in the course of two years so that the annual measurement of such dust to the earth is equal to 14.3 million metric tons. The rate of accretion for interplanetary dust to the earth is calculated as only a little more than 4% of that for meteoric dust, or 0.62 million tons a year. *Subject Headings:* **1. Cosmic dust 2. Radioactive fallout 3. Hawaii.** —*I.L.D.*

12.3–79 551.510.721:546.294

Delibrias, G. and Jehanno, C., **Activité de l'atmosphère due au krypton 85.** [Atmospheric activity due to krypton 85.] Photostat of separated pages of *France. Commissariat à l'Energie Atomique, Bulletin d'Informations Scientifiques et Techniques*, No. 30:14–15, June **1959.** 2 figs., 5 refs. **DWB** (M10.72 D353ac)—An evaluation of the amount of krypton 85 that collected in the atmosphere as the result of nuclear explosions, 1954 through 1958. Data on the amount of krypton 85 that rises into and disintegrates in the air are given. In some areas an average disintegration rate of 1.1 per minute per cu m of air has been recorded. The amount of krypton 85 that hovers over the Paris area varies from $2\times10^{-9}$ to $2\times10^{-11}$ c/cm³. *Subject Headings:* 1. **Krypton 85** 2. **Radioactivity due to krypton.**—*N.N.*

12.3–80 551.510.721

Rand Corporation, Santa Monica, Calif., **Close-in fallout.** Its *Project Rand* [*Publication*], R-309, Sept. 30, 1957. pub. **1958.** 40 p. 12 figs., table, foot-refs. **DWB** (M94.143 R186cL)—This is a concise, nontechnical survey of knowledge concerning the factors affecting the fallout of radioactive particles within a few hundred miles from nuclear explosions, and of methods available for computing and predicting such fallout, with emphasis on research conducted by Project Rand. Effects of wind and rain are considered. *Subject Heading:* 1. **Radioactive fallout.**—*G.T.*

## B6. FORESTRY—FIRE WEATHER

*See also:* **Bush fire effects on thunderstorms** (Dessens), 12.3-257; **Forest influences on river ice breakup** (Baĭdin), 12.3–442.

12.3–81 551.586:634.9

Andersen, H. E., **Climate in southeast Alaska in relation to tree growth.** *U. S. Forest Service. Alaska Forest Research Center, Station Paper*, No. 3, June **1955.** 3 figs., 3 tables, 11 refs. **DA, DWB** (M86:634.A544cl)—Increased interest in the forests of Southeast Alaska and silvical studies conducted by the Alaska Forest Research Center made it necessary to compile information on climatic factors considered most vital for tree growth. These factors include amount and distribution of precipitation; mean temperature of growing period; mean temperature for the coldest period of the year; and number of frost-free days. These data have been summarized from Weather Bureau records and are presented in Tables 2 and 3. Rainfall in Southeast Alaska is probably excessive for optimum tree growth as the high rainfall tends to cause an excess of groundwater. Best sites here are found on well-drained areas. Low temperatures during the growing season may be a limiting factor for tree growth as shown by the preponderance of high site classes on south slopes and decrease of average site index in the northern portion. *Subject Headings:* 1. **Climate effects on tree growth** 2. **Southeast Alaska.**—*Author's abstract.*

12.3–82 551.586:582.632:581.14

Clark, J. and Barter, G. W., **Growth and climate in relation to dieback of yellow birch.** *Forest Science*, Wash., D. C., 4(4):343–364, Dec. **1958.** 11 figs., 4 tables, 44 refs. **DWB**—This paper brings together results of several studies which provide evidence regarding the spread of birch dieback and the relation of the disease to measurable climatic factors. The method used and results obtained in studies of radial growth and mortality are described. The data are presented in graphs. A summary of statistical analyses of climatic factors and growth of yellow birch in the Maritime Provinces is included. Analyses of climatic data according to Thornthwaite's water balance technique have revealed a more realistic basis of evaluating the effect of climate on the growth of yellow birch than the conventional sums of precipitation or averages of temperature can provide. The facts, together with the authors' evidence of spread and BERBEE's description of typical virus symptoms, suggest that birch dieback is an infectious disease. The water balance variations and the fact that growth reduction was greatest in vigorous trees cannot be reconciled with the hypothesis that dieback is a purely physiological disturbance brought about by climatic stress. *Subject Headings:* **1. Climate effects on tree growth 2. Yellow birch dieback 3. Soil moisture depletion 4. Birch 5. New Brunswick, Canada.**—*E.Z.S.*

12.3–83 551.588.6:551.578.46

Bogdanova, E. L., **Osobennosti raspredeleniia snegozapasov v zalesennykh basseĭnakh.** [Characteristics of snow storage distribution in forested basins.] *Meteorologiia i Gidrologiia*, Leningrad, No. 6:36–37, June **1958.** 2 figs., ref., eq. **DWB**—On the basis of decadal and pentadal snow survey observations carried out over an extensive period in the Ilmen-Volkhov basin, the author discusses the differences in the formation of snow deposits in forest and field. A graph of the relationship between maximum snow accumulation in forest and field shows that the mean coefficient of the excess of the former over the latter is 1.2. In view of the fact that in some years of warming no snow remained in the fields it is proposed that a direct relationship exists between the excess of snow deposits in forests over those in fields and the sum of positive temperatures, namely $S_{f0}/S_{fi}-f(\Sigma T)$. A graph of this relationship is presented for the Ilmen-Volkhov basin. *Subject Headings:* **1. Snow surveys 2. Forest influences on snow accumulation 3. Ilmen-Volkhov basin, U.S.S.R.**—*I.L.D.*

12.3–84 551.5:061.1:632.187(756)

Hood, Frank C., **Outline of Fire Weather District 8, Asheville, North Carolina.** (With statistics and supporting correspondence.) "Outline," 6 p. Typescript. Other enclosures not paged. [ND.] **DWB** (M(06) U587out)—A description of the fire weather service of the U. S. W. B. at Asheville, N. C., with several folded charts showing districts served (forests), reporting stations, etc., and statistics on area under control, letters from various interests in 7 states in reply to a request for information on monetary value of fire weather forecasts to forest protection or utilization agencies. *Subject Headings:* **1. Fire weather service 2. Asheville, N. C.**—*M.R.*

12.3–85 551.553:632.187(94)

Larkins, A. W., **The effect of wind changes on fires.** (In: Fire Weather Conference, Melbourne, Australia, July 1958, **Proceedings,** issued Melbourne, **1958.** Conference Paper, No. 5 (8 p.). 4 figs.) **DWB**—Jan. 28, 1952 marks the date of the worst fires in the history of parts of southern Riverina in New South Wales and in northeastern Victoria. Temperature rose to 107°F by noon and wind velocities reached 54 mph from the north. The relative humidity dropped as low as 2%. Within those hours the undulating country between Holbrook and Walwa was devastated. The paper discusses important fire fighting tactics. The Meteorological Bureau (Australia) is urged to watch closely for any future occurrence of such hazardous conditions and to issue warnings as early as possible. *Subject Headings:* **1. Fire weather conditions 2. Wind effects on forest fires 3. Australia.**—*N.N.*

12.3–86 551.557.5:551.515.3:632.187

Whittingham, H. E. (*Bur. of Met., Brisbane*), **Fire whirlwinds at Imbil.** *Australian Meteorological Magazine,* Melbourne, No. 25:59–72, June **1959.** 6 figs., 3 tables, 10 refs. **DWB**—A description is given of a 15 acre overburn caused by fire whirlwinds during scrub-burning operations at Imbil on 19 Nov. 1957. This is followed by an analysis of the associated synoptic situation with some reference to the Schaefer effect whereby jet streams may affect surface wind conditions. The similarity between fire whirlwinds and sand devils is discussed and the diverging paths of the two Imbil whirlwinds explained. Calculations indicate that wind speeds in one of the whirlwinds exceeded 50 *kt.* *Subject Headings:* **1. Fire whirlwinds 2. Jet stream effects 3. Imbil, Queensland.**—*Author's abstract.*

## B7. INDUSTRY

*See also:* **Engineering met.** (Biggs et al.), 12.3–1; **Microclimat. of waste-dumps** (Kozłowska), 12.3–435.

12.3–87 551.5:17

Jacobs, Woodrow C. (*Scott Air Force Base, Ill.*), **Meteorology applied is a social affair.** *American Meteorological Society, Bulletin,* 40(4):179–181, April **1959. DWB, DLC**—Remarks on responsibilities and attitudes of the applied meteorologist given at the opening of the Conference on Applied Meteorology at Ann Arbor, Michigan, Sept. 9, 1958. The author expresses the following ideas: 1) the successful applied meteorologist creates the intellectual atmosphere in which he operates, 2) he has a sincere personal concern for the problem of the operator, as distinguished from purely scientific curiosity, and 3) he distinguishes between professional responsibility and scientific integrity and acts accordingly. In other words, he finds it better to assist in making decisions even in the face of incomplete facts than to force others to make decisions in complete ignorance. *Subject Headings:* **1. Applied meteorologists 2. Meteorological ethics.**—*M.R.*

12.3–88 551.556:551.510.42:62

Hewson, E. Wendell (*Univ. Mich.*) and Baynton, Harold W. (*Bendix Systems Div. Ann Arbor*), **Meteorology: a modern tool of management, Pt. 1.** *Air Engineering*, Detroit, 1(4):37–39;49;51, July 1959. 3 figs., "First of a continuing series on how the engineer may use met. knowledge. . . ." **DWB**—Since weather or atmosphere is an essential component in the disposal of waste products of combustion, smelting, chemical processing and various other types of industrial operation, basic knowledge of meteorology for an air pollution engineer is essential. In any consideration of air pollution problems, wind is a very important factor - wind direction will indicate where the effluent is going; wind speed will tell how quickly it will reach any specified point and will determine the initial dilution at the point of release; turbulent winds will generally be associated with good dispersion; finally, the presence of an inversion will usually impose some constraint on the mixing of the atmosphere. Wind and other climatological data of a site will reveal what emissions the atmosphere is capable of dispersing, where the contaminants are most likely to be carried, which seasons are most likely to bring air pollution problems, etc. Such information is of great help to an air engineer whether he is interested in deciding a suitable site for a new factory or he is confronted with a community-wide air pollution control problem. *Subject Headings:* **1. Wind effects on atmospheric pollution 2. Engineering climatology.**—*I.S.*

12.3–89 551.556:629.113

Benner, William (*Univ. of Michigan*), **Engineering meteorology: wind effects on motor vehicle stability.** *American Meteorological Society, Bulletin*, 39(8):421–426, Aug. **1958.** 5 figs., 10 refs. **DWB, DLC**—The manner in which wind can influence the operation of a motor vehicle and hence its safety is analyzed by considering the effect of longitudinal (head or tail) winds and cross winds. The former manifest themselves principally in the load placed on the engine; a secondary effect is the decrease in weight and change in weight distribution at high air speeds. The principal factors contributing to the erratic motion of a car are manifested most clearly when the longitudinal wind comes in irregular gusts. In the case of cross winds, the resultant of two vectors becomes a primary consideration and the effects of yaw, the rotational tendency about the yaw, the translation tendency of side-slip, the slip angle and the characteristics of the vehicle contributing to the effect of cross winds, are discussed. The measurement of wind speed and direction was made with a bridled anemometer. The results of tests indicate that "as the resultant wind direction changes from head-on, the total sidewise force exerted on a test vehicle by the wind increases at a significantly greater rate than the cross-sectional area increase of the car normal to the wind." This is most important for resultant wind angles within 10° of head-on. A gust striking at an angle to the direction of travel causes a sudden lateral displacement of the car and to turn it from its initial course. Whether gusts of sidewinds strike a moving car its aerodynamic stability is determined by "the degree to which lateral thrust forces due to winds are equalized between front and rear wheels and the extent to which the air resistance of the car to winds from the side is reduced." *Subject Headings:* **1. Engineering meteorology 2. Wind effects on motor vehicles.**—*I.L.D.*

12.3–90 551.556.1:69.024

Lawson, J. I., **Wind damage to asphalt shingle roofs.** 3 separated pages from *Royal Architectural Institute of Canada, Journal*, May **1956.** table. Also issued as *National Research Council of Canada. Div. of Building Research, Technical Paper*, No. 37. Price: $.10. **DWB** (690 N277t)—In May 1951, the Division of Building Research, National Research Council adopted the Canadian method of covering roofs with asphalt shingles as a check to severe wind storms. This report shows the data on which the results of the Canadian meteorological investigations were based. The station was Ottawa. Table shows the maximum wind velocities for 1945 to 1950. Recommendations are offered as to the use of asphalt shingle roofing that might produce favorable result against damaging wind storms. *Subject Headings:* **1. Wind damage to roofs 2. Roofing construction 2. Wind damage prevention.**—*N.N.*

12.3–91 551.556.3:621.311.24:631.67(54)

Bhatia, K. L. (*Met. Dept., India*), **Utility of wind power for lifting ground water in India.** (In: India. Central Board of Geophysics, **Proceedings of the Symposium on Ground Water, New Delhi, Feb. 1955,** pub. 1958. p. 318–326. 4 tables, 6 refs.) **DWB**—In India windmills are not widely used in pumping water for agricultural purposes. Data on amount of water which could be pumped by a 10 ft diameter windmill, 40 ft above the ground, assuming 25% efficiency, for 16 places in India, are tabulated for each month of the year along with depth of the water table. The figures are given in gallons per hour, and in inches per acre per month. Actual rainfall is also given for each of these places. In windy areas of low rainfall (e.g., Jodhpur) the supplemental irrigation provided by wind power may be the critical factor in having a crop or no crop, so it is not essential that wind power provide all of the needed water. *Subject Headings:* **1. Wind power utilization 2. Irrigation by wind power 3. Wind power surveys 4. India.**—*M.R.*

12.3–92 551.5:621.316(420)

Davies, M. (*Central Elec. Generating Board*), **Grid system operation and the weather.** *Weather*, London, 15(1):18–24, Jan. **1960.** 2 figs. **DWB**—With special reference to England, the author discusses the effect of temperature, wind, fog and precipitation upon electricity demand, estimation of electricity demand by each Grid Control Centre on the basis of special regional weather forecasts issued every few hours by the nearest Meteorological Office Regional Centre, the establishment and use of the weather weights system, and studies on the relationship between "effective" temperature cooling power of the wind and intensity of daylight illumination and demand of electricity. "Effective" temperature takes into account the time lag of consumer response to temperature variations due to thermal storage in the fabric of buildings. Finally, the relationship between the control engineer and weather is considered. *Subject Headings:* **1. Weather effects on electric power system loads 2. England.**—*I.L.D.*

12.3–93 551.5:621.311

Benner, William (*Univ. of Michigan*), **Engineering meteorology: weather influences on electrical utility load dispatching.** *American Meteorological Society, Bulletin,* 39(10):514–520, Oct. **1958.** table, 16 refs. **DWB, DLC**—The problem of load dispatching of electric utilities is discussed to show the part that weather plays in typical load dispatching techniques, both long range and short range. An effort is made to evaluate the significance of various meteorological parameters and to show the overall importance of taking weather effects into consideration from the viewpoint of improving operating efficiency and economy of utilities. Finally, consideration is given to bring out the regions where the activities of meteorologists are most desired by the utilities. *Subject Headings:* **1. Engineering meteorology 2. Electrical utility load dispatching.**—*Author's abstract.*

12.3–94 551.464:551.556.1:621.315.2

Sanpei, J., **Forecast of salty wind damage to electric power cables.** *Japan. Meteorological Agency. Tokyo, Memoirs of Industrial Meteorology,* 22(1):31–37, **1958.** 3 figs., 4 tables, 6 refs., eqs. In Japanese; English summary p. 37. **DLC.** Reprinted in *Sendai, Japan. Central Meteorological Observatory, Journal of Meteorological Research of Tohoku District,* Vol. 12, Memoir No. 11, March **1959.** 7 p. 3 figs., 4 tables, 6 refs. **DWB**—In the Tohoku District of Japan, electric power cables along the coast of the Japan Sea often suffer heavy damage from salty sea winds when typhoons of a developed stage pass through the Japan Sea. From the viewpoint of weather forecasting to prevent this damage, the author has investigated the mechanism of the occurrence of this damage and the possibility of forecasting it. The occurrence of this damage is considered to be caused by spray which is produced by sea waves of "young wave age," and the conclusions may be summarized as follows: (1) Typhoons heading north along the coast of the Japan Sea and cyclones which are in the developing stage and pass over the sea produce a large quantity of spray on the sea which is brought to the coast and liable to cause heavy damage to power cables. (2) Heavy damage is seldom caused by monsoons. (3) The critical value of wind velocity at the coast in regard to the occurrence of salty wind damage depends upon weather conditions, but when the maximum velocity reaches

25–30 m/s, the damage generally occurs. *Subject Headings:* **1. Salt deposition on power lines 2. Wind driven sea spray.**—*Author's abstract.*

12.3–95 551.5:666.97(713)

†Swenson, E. G., **Weather in relation to winter concreting.** *National Research Council of Canada. Div. of Building Research, Technical Paper,* No. 46, Feb. **1957.** 38 p. 13 figs., 2 tables, 23 refs. **DWB** (690 N277t)—Not only local air and soil temperature but wind, conduction, radiation, and other weather elements affect the temperatures within a mass of fresh concrete. Various methods of predicting concrete temperature are explained and compared. The use of climatic and weather data are explained and illustrated by means of curves, graphs and diagrams. The environmental conditions must first be forecast and then the resulting temperatures within the concrete predicted. The latter is a heat exchange problem whose constants may be worked out in the laboratory. Of course, it is not possible to simulate weather conditions on a large scale, but the properties of the materials themselves can be determined by models. Microclimatology must always be considered. Examples from Ontario weather studies show variability of microclimatic conditions in short distances. *Subject Headings:* **1. Weather effects on winter concreting 2. Ontario.**—*M.R.*

12.3–96 551.524.31:551.571.36:620.191(54)

Rajagopalan, K. S. and Ramaseshan, G. (*both, Central Electrochemical Res. Inst., Karaikudi*), **Atmospheric corrosion at Karaikudi.** *Journal of Scientific and Industrial Research, Sec. B,* New Delhi, 17(10):438–439, Oct. **1958.** 2 figs., ref. **DWB, DLC**—Compton's conclusions of factors contributing to increased corrosion in the tropics are tested by observing monthly rates of corrosion of steel and zinc in Karaikudi, southern India. Technique of corrosion observation is described and rate of corrosion in different months and meteorological data collected at Madurai are graphically represented. Finally, the Karaikudi observations are also compared with Kanpur corrosion data. It is concluded that the acquired data at Karaikudi best corroborated Compton's observations that increase in mean temperature accompanied by fairly high humidities and considerable fluctuations in diurnal temperature are the factors which cause increased corrosion of steel in the tropics. *Subject Headings:* **1. Diurnal temperature variations 2. Humidity variations 3. Corrosion of metals 4. Karaikudi, India.**—*I.S.*

## B8. RADIO COMMUNICATION

*See also:* **Trade wind inversions as a transoceanic duct** (Katzin et al.), 12.3–349; **Radio reflections from meteor trails** (Rao, Armstrong), 12.3–357.

12.3–97 551.510.52:621.396.1

Thompson, Moody C., Jr., Janes, H. B. and Kirkpatrick, A. W. (*all, Natl. Bur. of Standards, Boulder, Colo.*), **An analysis of time variations in tropospheric refractive index and apparent radio path length.** *Journal of Geophysical Research,* Wash., D. C., 65(1):193–201, Jan. **1960.** 15 figs., 8 refs. **DWB, DLC**—The National Bureau of Standards has been conducting a series of measurements for a study of the characteristics of the turbulent lower atmosphere and its effect on the accuracy of radio direction-finding, guidance, and geodetic measurement systems. The results of three experiments are presented, one consisting of recordings of refractive index and apparent path length variations at 9400 Mc/s over a 15.5 mi path on Maui, Hawaii and the other two consisting of similar measurements made over a 9.5 mi path near Boulder, Colo. The correlation of refractive index and apparent path length fluctuations is discussed as well as the power (variance) density spectra of both variables. *Subject Headings:* **1. Tropospheric refractive index 2. Radio path length variations.**—*Authors' abstract.*

12.3–98 551.510.52:621.396

Thompson, M. C., Jr. and Janes, H. B., **Measurements of phase stability over a low-level tropospheric path.** *U. S. National Bureau of Standards, Journal of Research, Sec. D,* 63(1):45–51, July/Aug. **1959.** 9 figs., 5 eqs. **DLC, DWB**—A knowledge of the statistics of atmosphere-induced variations in the phase of the received signal (i.e., variations in electrical path length) is essential in evaluating the reliability of any system using radio waves for measuring distance and/or velocity. This paper describes an analysis of phase variations measured at 9400 megacycles per second over a 9.4 mi path near Boulder, Colo., during a 40-hr period in September 1958. This power spectral density of these variations is shown to be approximately proportional to $f^{-2.8}$ over a wide range of frequencies throughout the period of recording. The long-term phase variations are closely correlated with atmospheric refractivity measurements made at the path terminals. *Subject Headings:* **1. Tropospheric radio wave propagation 2. Radio signal phase variations 3. Refractive index.**—*Authors' abstract.*

12.3–99 551.510.52:551.510.62:621.396.8

Bugnolo, Dimitri S. (*Dept. of Elec. Eng., Columbia Univ.*), **On the question of multiple scattering in the troposphere.** *Journal of Geophysical Research*, Wash., D. C., 65(3):879–884, March **1960.** 2 figs., 17 refs., 3 eqs. **DLC**—A criterion is developed to serve as a measure of multiple scattering in the troposphere as a result of dielectric noise. The question to be answered is: What is the probability that any ray of the incident field will be scattered at least twice in a distance *R*? This useful criterion can serve as a measure of reliability for the usual single-scatter approximations. It is developed in detail for an arbitrary dielectric noise and is applied to a number of special cases. The results indicate that multiple-scattering effects should be of importance in the microwave spectrum. *Subject Headings:* **1. Tropospheric radio wave propagation 2. Multiple tropospheric scattering 3. Dielectric noise.**—*Author's abstract.*

12.3–100 551.510.52:551.510.62:621.396.1

Bolgiano, Ralph, Jr. (*School of Elec. Eng., Cornell Univ., Ithaca*), **Wavelength dependence in transhorizon propagation.** *Institute of Radio Engineers, N. Y., Proceedings*, 47(2):331–332, Feb. **1959.** fig., 7 refs., 7 eqs. **DLC**—Results of two tests made simultaneously during the winter, spring and early summer of 1957 at the Lincoln Laboratory of MIT on 417.05 mc and 2290 mc are described. Tests were conducted on the transhorizon path from Round Hill, Mass. to Crawford's Hill, N. J. During the period Feb. 11 to July 11, data were collected continuously for intervals of 12 to 72 hrs. From closely scaled antennas, continuous signals of 3.5 kw and 10 kw were radiated on 417 mc and 2290 mc, respectively. Cumulative distributions of the signal level received on each channel during the 241 cases (hours) investigated were then recorded. Differences in the measured hourly median for the basic transmission loss is illustrated graphically. It shows the empirical distribution of the wave length dependence, the variation of the data at substantially better than the 0.001 level. A significant relation of this variation to meteorological phenomena is drawn. *Subject Headings:* **1. Tropospheric radio wave propagation 2. Radio wave propagation beyond the horizon.**—*N.N.*

12.3–101 551.510.62:621.396.1

†Wait, James R. (*Nat. Bur. of Stands., Boulder, Colo.*), **Terrestrial propagation of very-low-frequency radio waves: a theoretical investigation.** *U. S. National Bureau of Standards. Journal of Research, Sec. D*, 64(2):153–204, Mar./April **1960.** 10 figs., table, bibliog. p. 201–204, 13 eqs. **DWB, DLC**—A self-contained treatment of the waveguide mode theory of the propagation of very-low-frequency radio waves is presented. The model of a flat earth with a sharply bounded and homogeneous ionosphere is treated for both vertical and horizontal dipole excitation. The properties of the modes are discussed in considerable detail. The influence of earth curvature is also considered by reformulating the problem using spherical wave functions of complex order. The modes in such a curved guide are investigated and despite the initial complexity of the general solution, many interesting and limiting cases may be treated in simple fashion to yield useful and convenient formulas for calculation. Other factors considered are the influence of the earth's magnetic field, antipodal effects, resonator type oscillations, and the influence of stratification at the lower edge of the ionosphere. *Subject Headings:* **1. VLF radio wave propagation 2. Wave guide mode theory of VLF radio wave propagation.**—*Author's abstract.*

12.3–102 551.510.52:551.510.62:621.396

*Carr, T. R., **Tropospheric propagation study progress report for 1955: countermeasures program.** *U. S. Naval Air Missile Test Center, Point Mugu, Calif., Technical Memorandum Report*, No. 102, July 1, **1956.** 21 p. 25 p. of charts (33). 11 figs., 18 refs. Also: Carr, T. R. and Appel, John, **Tropospheric propagation study progress report for 1956.** *Ibid.*, No. 106, May 1, **1957.** 95 p. 95 figs. (incl. photos), 12 refs., eqs. **DWB** (M(055) U5842uni)—Strong refractive index gradients associated with temperature inversions along the Southern Calif. coast result in radio holes and ducts that interfere with missile tests at the Naval Air Missile Test Center (Point Mugu, Calif.). Two air-borne microwave refractometers from the University of Texas were used in 1955 and 1956 to obtain refractive index profiles over the sea and these were compared with profiles calculated from radiosonde data at shore stations. Anomalous propagation data uses, terrain, meteorology of area, instrumentation, sounding procedures, methods of calculating and comments on individual soundings, plus a large number of the soundings made in Jan. 1955–Dec. 1956 are described, illustrated or presented in graphical form in these reports. Flight paths are also shown. *Subject Headings:* **1. Tropospheric radio wave propagation programs 2. Air-borne refractometer profile data 3. Refractive index profiles.**—*M.R.*

12.3–103 551.510.62:621.396:061.3

Herbstreit, Jack W., **The Ninth Plenary Assembly of the CCIR.** *Institute of Radio Engineers, Proceedings*, 48(1):45–53, Jan. **1960.** 2 refs. **DLC**—The International Radio Consultative Committee held its Ninth Plenary Assembly in Los Angeles, Calif., April 2 through 29, 1959. The CCIR studies the technical factors affecting international radio telecommunications and makes recommendations to administrations which are of importance in the international allocation and usage of the radio spectrum. These studies are made by fourteen Study Groups, each dealing with certain aspects of international telecommunication. At the Los Angeles meeting, the technical aspects of relatively new techniques for conservation of spectrum space were considered. Transmission and receiving standards, propagation characteristics, monitoring methods, modulation techniques including single sideband and stereo sound broadcasting, and the new international aspects of telecommunication with and between space vehicles were among the many topics considered by the Assembly. *Subject Headings:* **1. Radio conferences 2. International radio telecommunications. I. International Radio Consultative Committee (CCIR).**—*Author's abstract.*

## C. ASTRONOMY AND ASTROPHYSICS

### C1. SUN

*See also:* **Solar influences on ionos.** (Chapman), 12.3–120; **Solar influences on ionos.** (Haubert), 12.3–121; **Solar flare effects on ionos.** (Minnis, Bazzard), 12.3–123; **Sunspot effects on precip.** (Naqir), 12.3–395.

12.3–104 523.7:061.3

Jäger, F. W., **Die Sonnenphysik auf der I.A.U.-Tagung in Moskau.** [The Physics of the sun at the I.A.U.-session in Moscow.] *Die Sterne*, Leipzig, 35(3/4):49–57, **1959. DLC**—Discussion of practical and theoretical questions in the field of solar physics had an important place at the 16th session of the International Astronomical Union in Moscow, Aug. 1958. The author reports on the sessions of the different commissions: photospherical phenomena; cinematography of chromosphere phenomena; solar activity; radio astronomy; radiation and solar spectroscopy; eclipses and stellar atmosphere theory. *Subject Headings:* **1. Physics of the sun 2. International Astronomical Union, Moscow.**—*A.V.* Ⓢ

12.3–105 522.612:778.36 523.741

Dommanget, J. (*Royal Obs. of Belgium*), **Le nouvel appareillage photographique utilisé sur l'équatorial de 45 cm d'ouverture de l'Observatoire Royal de Belgique.** [The new photographic equipment used on the 45 cm-aperture equatorial of the Royal Observatory of Belgium.] *Ciel et Terre*, Brussels, 75(3/4):123-128, March/April **1959.** 3 figs., 3 plates, 3 refs. **DLC**—Describes the new photographic equipment used on the 45 cm-aperture equatorial of the Royal Observatory of Belgium, and enumerates the various improvements which were effected in it. This equipment is not only intended for photographic observing of the mean shape of lunar profile and drawing up of a program for photographic observation of double stars, but also for taking photographs of the sun. Three plates supply photographic reproductions of a region of the solar surface, on which appear very distinctly photospheric granules, the sizes of which vary about 1.5″. Attention is drawn to the importance of the phenomena of turbulence in obtaining good photographs of the photosphere. *Subject Headings:* **1. Astronomical photographic equipment 2. Solar photographs 3. Photosphere 4. Photospheric granules.**—*A.V.* Ⓢ

12.3–106 523.77:778.37:629.136.3

de Jager, C., **Een zonnefoto vanuit een raket.** [A photo of the sun taken from a rocket.] *Hemel en Dampkring*, The Hague, 57(5):126–127, May **1959.** 3 photos. **DWB, DLC**—The article treats of a positive photo of the sun in the light of the Lyman $\alpha$-line (wave length 1215 Å) taken from an Aerobee-rocket on May 8, 1956, at a height of 145 km. This photo corroborates the supposition that the activity centers of the sun emit a much stronger Lyman $\alpha$-radiation than the undisturbed parts. At the same time photos were taken at sea-level. Two photos are shown: a negative photo in the light of the Balmer $\alpha$-line (wave length 6563 Å) and a negative photo in the light of the K-line (wave length 3934 Å). A comparison is made between the three photos. *Subject Headings:* **1. Solar photography 2. Aerobee-rocket photographs 3. Solar activity centers 4. Lyman $\alpha$ and Balmer $\alpha$ lines.**—*A.V.* Ⓢ

12.3–107 523.746:551.**524.36**(492)

Visser, S. W. (*Utrecht Univ.*), **De elfjarige zonnevlekkencyclus.** [Eleven-year sunspot cycle.] (In: **The Earth: its crust and its atmosphere.** Pub. Leiden, E. J. Brill, **1957.** p. 236–247. 5 figs., 4 tables, 9 refs. English summary p. 236.) **DLC** (GB7.E2)—A concise analysis of the 11 and 89 year periodicities in sunspots from 1750 to 1957, and of severe winters in Europe from 1739–1957. Graphs show: 1) the location of sunspots on the sun's surface (E. W. MAUNDER, for 1874–1913); 2) the M. Waldmeier diagram for A (strong), B (moderate) and C (faint) cycles of 11 years; and 3) the irregularities of the sunspot cycle calculated in different ways (intensity duration) showing, in spite of irregular relation, a strong negative correlation (−0.80) between duration of cycle (maximum-minimum) and difference between sunspot numbers of the maxima. C. EASTON's 89 year period is shown to have some significance (1750–1957), and 24 severe winters subdivided into 4 groups of two cycles, agreeing with EASTON's cycle to some extent. *Subject Headings:* **1. Sunspot cycles 2. Severe winters, Netherlands 3. Netherlands.**—*M.R.*

12.3–108 **551.583.14:551.590.21**

Link, Frantisek, **Kometen, Sonnentätigkeit und Klimaschwankungen.** [Comets, solar activity and climatic variations.] *Die Sterne*, Leipzig, 34(7/8):129–140, **1958.** 10 figs., 14 refs. **DLC**—Beside solar activity periods of 11 and 80 years, there is also the 400 year period. This period of 400 years is accompanied by a secular variation in the length of the 11 year cycle and has also as result a climatic variation. Cloudy and wet periods are in relation with secular maximums of solar activity and inversely. The author gives in tabular form an insight into solar activity and observed terrestrial phenomena for the 400 year cycle. *Subject Headings:* **1. Climatic variations 2. Secular trend 3. Solar influences.**—*A.V.*

12.3–109 523.755

*Billings, Donald E., **Climax coronal intensities, Dec. 12, 1941–May 21, 1944.** Colorado. Univ. High Altitude Obs., Climax, Contract DA-23-072-ORD-929, Report No. HAO-37, Sept. 3, **1957.** 50 p. 4 tables, 3 refs. **DWB** (523.74 C719r)—Since the first coronal spectrogram was photographed at Climax, Colo. on Dec. 12, 1941, systematic photography of the spectrum of the solar corona has continued resulting in the most complete collection of coronal spectrograms in existence. An observation by WALDMEIER concerning the corona (*Zeit. für*

*Astrophysik*, 35:1, 1955), led to a project "for the reduction of the old plates (1941–1944) and the deduction from the resulting data of whatever information they might reveal concerning the behavior of the corona during sunspot minima." A compilation of the coronal intensities is included. *Subject Headings:* **1. Coronal spectrograms 2. Coronal intensities 3. Climax, Colo.**—*M.L.R.*

12.3–110 523.746:551.524.33

Sugawa, C., **Abnormally long-lived sunspot groups and 25-day period in air temperature.** *Society for the Long-Range Forecast Research of Tohoku District, Journal*, 12(2):5–9, July 1952. 3 tables, 6 refs. In Japanese. **DWB**—During January–July 1951 there were two large sunspot groups which survived for 6 months and which had a 25-day period in relative number corresponding to a 25-day period in air temperature. These parameters and the daily mean air pressure deviations were analyzed by a periodogram. The minimum temperature occurred near and after the maximum sunspot number, and the maximum air pressure occurred 4 days before the maximum sunspot number. Curves show data on deviation of pressure, temperature and sunspots from August 1950–January 1951, January 1951 to July 1951, and July 1951 to January 1952 to show relationships during, before and after this period. A visible correspondence is noted during the period of high sunspot activity. (For abstract from another source, *see* 8A-109, Jan. 1957, *Met. Abs.*) *Subject Heading:* **1. Sunspot effects on temperature.**—*M.R.*

12.3–111 551.590.21:551.513.2:551.515

Arai, Y. (*Met. Res. Inst., Tokyo*), **Characteristics of long waves in westerlies related to solar-activity.** *Meteorological Society of Japan, Tokyo, Journal*, 36(2):46–54, April 1958. 9 figs., 5 tables, 7 refs. **DWB, DLC**—The amplitude and the phase angle of the five harmonics for the mean values of 500 mb height along the 50°N lat. circle are investigated relative to the characteristics of long waves on mean charts and solar activity. The split of developed ridges occurs generally in Europe in winter. This is connected with the horizontal wind shear at 50°N lat. and may be caused by topographical effects. The amplitude of the first and the second harmonics are negatively and positively correlated with the sunspot numbers, respectively. This relationship holds also to the short time-change of the sunspot numbers. The effect of sunspot activity is significant in winter and at the 500 mb level. *Subject Headings:* **1. Waves in the westerlies 2. Sunspot effects of westerlies.**—*Author's abstract.*

12.3–112 551.590.21:551.513.1:551.521.31

Spar, Jerome, **Meteorological models for the study of atmospheric responses to anomalous solar emissions: a technical report.** *Colorado. Univ. High Altitude Observatory. Institute for Solar-Terrestrial Research, Technical Report*, No. 5, Oct. 1958. 19 p. 2 figs., 7 refs., 53 eqs. **DWB** (M13.1 C719t)—The research so far undertaken on atmospheric responses to anomalous solar emissions is presented here. Describes three models which deal with the effects of a thermal disturbance in the mesodecline on the circulation in a vertically constrained mesodecline, and the vertical motions at the internal boundaries. *Subject Headings:* **1. Solar radiation anomalies 2. Solar-atmospheric relationships.**—*N.N.*

12.3–113 551.590.21:551.513:551.583.14

Girs, A. A., **Mnogoletnie preobrazovaniia form atmosfernoĭ tsirkuliatsii i izmeneniia solnechnoĭ aktivnosti.** [Secular transformation of the form of the atmospheric circulation and fluctuations in solar activity.] *Meteorologiia i Gidrologiia*, No. 10:3–13, Oct. 1956. 4 figs., 15 refs. **DWB, DLC.** English transl. available. **DWB** (M13 G5288pe)—The transformation of the circulation types *W*, *C*, *E* over the period 1891–1955 are analyzed. Graphs show the variations in the intensity of development of the types *W*, *C* and *E*, and the behavior of these types in the Atlantic-Eurasian sector and Oceanic-American sector are described. In the case of the latter, the zonal and meridional processes, expressed as the number of days with $Z$, $M_1$, $M_2$ types, are analyzed. The short term or seasonal variations in the circulation types are explained in terms of the heat exchange between hemispheres, heat balance of the atmosphere at the earth's surface, etc. In order to explain the epochal variations, the author attempts to establish a relationship with solar activity and compares variations in circulation types with those of Wolf sunspot numbers. The mechanism of possible interaction between solar activity and tropospheric processes is discussed. *Subject Headings:* **1. Atmospheric circulation trends 2. Secular circulation variations 3. Solar activity-general circulation relationships.**—*I.L.D.*

12.3–114 523.74:551.513:551.521.67

Asakura, T. (*Met. Res. Inst., Tokyo*) and Katayama, A. (*Tokyo Dis. Met. Obs., Tokyo*), **On the relation between solar activity and general circulation in the atmosphere.** *Papers in Meteorology and Geophysics*, Tokyo, 9(1):15–24, May **1958.** 6 figs., 10 refs., 3 eqs. Japanese summary p. 23–24. **DWB**—Relation between solar activity and variations of the general circulation is investigated by using data during winter of 1946–1956. *K*- and $C_i$-indexes which are measures of geomagnetic activity, are used to represent solar activity. As indices to represent a hemispheric flow pattern, kinetic energy of 5-day mean north-south wind component and amplitudes of each harmonic wave along 50° latitude circle are used. Summarizing the results, ten days or so after an intense sporadic outburst of corpuscular emission from the sun, a circulation pattern seems to change into a low index type and heat exchange along the meridian is intensified. A typical example of intense corpuscular emission and the subsequent change of the circulation pattern was observed in the middle of February 1958, when a record-breaking intensity of aurora was observed in many countries including abnormally low latitudes. *Subject Headings:* **1. Solar activity-general circulation relationships 2. Corpuscular emissions from sun.**—*Authors' abstract.*

## C2. METEORS

*See also:* **Radio reflections from meteor trails** (Rao, Armstrong), 12.3–357.

12.3–115 551.590.25:621.396.1

Landmark, B. (*Norwegian Defence Res. Establishment, Kjeller*), **The fading of long duration meteor bursts in forward scatter propagation.** *Journal of Atmospheric and Terrestrial Physics*, N. Y., 12(4):341–342, **1958.** fig., ref. **DLC**—Premise of this study was to demonstrate the applicability of Manning's method to investigation of wind shear in the lower E layer. The results are presented in curves for July and Oct. 1957, featuring the cross correlation between observed signal envelopes in two points with variable spacing $\xi$ and the mean value of the correlation determined for each fading cycle number $\eta$ plotted as a function of $\xi\eta$. The point of different values of $\xi$ followed the same curve, shape of which was approximately Gaussian in agreement with MANNING'S findings. The wave length used was 6.4 m and values of $\xi$ between 4 and 10. *Subject Headings:* **1. Radio wave scattering by meteor trails 2. Meteor trail radio transmission.**—*W.N.*

12.3–116 551.501.8:523.5

Hagfors, Tor (*Norwegian Defense Res. Inst., Kjeller*), **Meteorforskning ved radiomidler.** [Meteor research by radio methods.] *Fra Fysikkens Verden*, Blindern, Norway, 20(3):103–112, April **1959.** fig., 3 refs., 5 eqs. **DLC**—Radio observations as an explanation for meteor behavior when encountering the earth's atmosphere, the physical mechanisms contributing toward radio communication via meteor tracks and some of the more recent results obtained are discussed. Included is some of the meteorological knowledge gained about pressure, scale height and winds at 85–110 km. *Subject Headings:* **1. Meteor research 2. Radio observation of meteors.**—*W.N.* Ⓢ

12.3–117 621.396:523.53 551.506:523.53

Dubin, Maurice and Campen, C. F., Jr., **Meteors.** (In: **Handbook of geophysics for Air Force designers,** ed. by C. F. Campen, Jr. et al. 1st ed. Wash., D. C., **1957.** Reissued **1960.** Ch. 11 (10 p.). 9 figs., 3 tables, 11 refs., eqs.) **DWB**—Concentrated data in tabular and graphic form on meteor composition, speeds, size, number, showers, dynamics, interaction with atmosphere, penetration of surfaces and radio reflection or scattering from meteor trails, presented in outline form. *Subject Headings:* **1. Meteor data 2. Radio reflections from meteor trails.**—*M.R.* Ⓢ

### C3. RADIO ASTRONOMY

12.3–118 621.396.11:551.501.8:523.164

Laffineur, M. **Radio-astronomie (Commission V, XIIème Assemblée Générale de l'Union radio-scientifique Internationale.** [Radio astronomy (Report of Commission 5, 12th General Assembly of the International Scientific Radio Union).] *L'Onde Électrique*, 38(376):539 544, July **1958.** 8 figs., 6 refs. **DLC**—Report of Commission 5, meeting at the 12th General Assembly of the International Scientific Radio Union at which 130 papers were submitted. Among these, one should mention the study of A. HEWISH about an "aperture synthesis"; the theoretical study of interferometers with two elements (R. N. BRADEEWELL); the description and use of the big net installed in France at Nançay (E. J. BLUM), which makes it possible to discriminate between two types of radiation in solar "radioelectric storms"; the description of a new crossnet comprising 64 6-m reflectors functioning on a 21 cm wave length (W. N. CHRISTIANSEN) and an important apparatus installed by the National Bureau of Standards near Boulder (E. S. LAWRENCE and H. PENFIELD). The author also mentions accomplishments in regard to large aerials and studies relating to the Galaxy and planets. *Subject Headings:* **1. Radio astronomy 2. Interferometers 3. Aerials 4. Aperture synthesis.**—*A.V.*

## D. OUTER ATMOSPHERE

### D1. IONOSPHERE

*See also:* **Polar blackouts** (Kakura), 12.3–134; **Current distribution in the ionos.** (Fukushima), 12.3–135; **Earth current-ionos. relationships** (Hessler, Wescott), 12.3–175; **Ionos. elec. fields** (Volland), 12.3–178; **Ionos. drift measurements** (Sprenger), 12.3–281; **Ionos. winds** (Rao, Armstrong), 12.3–357.

12.3–119 551.510.535:551.510.62

Albrecht, Hans J. (*Schramberg-Sulgen, West Germany*), **Analysis of ionospheric paths in long-range propagation.** *Indian Journal of Meteorology and Geophysics*, New Delhi, 11(1):57–73, Jan. **1960.** 4 figs., table, 17 refs., 2 eqs. **DWB, DLC**—Based upon the author's previous work on ionospheric propagation, this paper describes new theoretical and technical methods of measuring and evaluating propagation paths over large distances. Following a detailed treatment of analysis by attenuation measurements and path diagrams, essential aspects of ionospheric path recorders are discussed with reference to modernized design and transistorization. *Subject Headings:* **1. Ionospheric propagation 2. Propagation paths 3. Ionospheric path recorders.**—*Author's abstract.* Ⓢ

12.3–120 551.590.21:551.510.535:523.755

†Chapman, Sydney, **Notes on the solar corona and the terrestrial ionosphere.** With a supplementary note by Harold Zirin. *Smithsonian Contributions to Astrophysics*, Wash., D. C., 2(1), **1957.** 14 p. 2 tables, 37 refs., eqs. **DLC**—For a model solar corona, static and spherically symmetrical, the radial distribution of temperature $T$ and number density $n$ is considered. For coronal gas composed solely of protons and electrons, the thermal conductivity varies as $T^{5/2}$, and depends little on $n$. A steady conductive heat flow to infinity ($T=0$) implies that $T$ varies as $1/r^{2/7}$, and that if the coronal temperature $T_0$ is of order $10^5$, the interplanetary gas is hot (about 2,000,000° near the earth). If in the hottest level of the corona the number density ($n_0$) is about $2\times10^8$ cc, near the earth $n$ is of order $10^3$, depending rather sensitively on $T_0$. This accords with zodiacal light indications, but differs from them as regards their suggestion of a rapid decrease of $n$ near the earth. It accords also with inferences drawn from radio studies of "whistlers." It is shown that the coronal gas will convey little heat to the dark side of the moon. It is suggested that the hot coronal gas surrounding the earth may be the cause of the downward flow of heat below the F2 peak in the terrestrial ionosphere; but difficult questions related to the influence of the geomagnetic field upon the fully ionized coronal gas render this suggestion speculative. It might be settled by observing the density or temperature above the F2 peak. The satellites to be launched during the IGY will move in regions where

such observations will be of special value in this connection. *Subject Headings:* **1. Sun's corona 2. Solar influences on ionosphere. I. Zirin, Harold.**—*Author's abstract.*

12.3–121 551.590.21:551.510.535:551.501.8:551.594.6(64)

Haubert, A., **La participation du Maroc à l'ètude des relations Soleil-Ionosphère dans le cadre de l'Année Géophysique Internationale.** [Participation of Morocco in studying sun-ionosphere relationships during the International Geophysical Year.] *Rabat, Morocco. Institut Scientifique Chérifien. Service de Physique du Globe et de Météorologie, Annales,* 18:137–145, **1958.** 6 figs. **DLC**—Survey of the participation of Morocco in the IGY, especially as concerns the study of solar rays and their action on the various layers of the ionosphere. A distinction is made between normal radiation and abnormal radiation (spots, faculae, chromospheric eruptions, etc.). The Ionospherical Laboratory at Rabat sorts out, in monthly tables, anomalies observed on ionospheric soundings, sudden fadings observed on recording of the field at Allouis station, sudden intensifying of the mean level of sferics on 10,000 m wave length. These data are compared with the lists of chromospheric eruptions and reinforcing of radioelectric noise. Correlations were numerous and their study is being undertaken. *Subject Headings:* **1. Solar influences on ionosphere 2. Chromospheric eruptions 3. Sferics 4. Radioelectric noise 5. Rabat. Allouis, Morocco.**—*A.V.*

12.3–122 537.56

Hurst, C. A. and Huxley, L. G. H. (*both, Univ. Adelaide*), **The distribution of ions formed by attachment of electrons moving in a steady state of motion through a gas.** *Australian Journal of Physics,* Melbourne, 13(1):21–26, March **1960.** 2 refs., 15 eqs. **DLC**—The distribution of ions formed by attachment of electrons diffusing through a gas is solved exactly, and the results compared with an approximate calculation given earlier by HUXLEY. The corrections to the approximate results are inside the present experimental error, and so confirm the satisfactory agreement with experiment already obtained. *Subject Headings:* **1. Ionized media 2. Ion diffusion.**—*Authors' abstract.* Ⓢ

12.3–123 523.75: 551.510.535

Minnis, C. M. and Bazzard, G. H. (*both, Radio Res. Station, Dept. of Sci. and Ind. Res.*), **Solar-flare effect in the *F2*-layer of the ionosphere.** *Nature,* London, 181(4610):690–691, March 8, **1958.** fig., table, 3 refs. **DWB**—During the flare of Feb. 23, 1956 at Singapore the great increase in D ionization was accompanied by a simultaneous increase in the critical frequency ($f$) of the F2 layer, a comparison between the curves for values of $f$ based on median values for ten contral days and for values of $f$ obtained by extrapolating backward from measured values of $f$ between 1123 and 1200 LMT suggests unusual values for $f$ at 1100 LMT and just afterwards (during the great increase in D layer ionization). The determination of a correlation between the flare and increase in critical frequency of the F2 layer is obtained by filling a line through a series of points $f_m(t)$, the critical frequency of the F2 layer and $f_m(f+1)$ the following hour. The departure of the measured value from the normal is given by the equation $\Delta f = f_m(t+1) - f_p(t+1)$. The presumed flare effect is seen to be a pulse of amplitude 1.1 Mc/s. The probability that a pulse of amplitude not less than 1.1 Mc/s is expected to occur by chance during the 27-day period 0.06 as compared with those pulses actually observed. The flares associated with the pulse of Feb. 23 are described. This flare occurred during a severe geomagnetic disturbance. *Subject Headings:* **1. Solar flare, Feb. 23, 1956 2. Solar flare effects on ionosphere 3. F2 layer 4. Singapore, China.**—*I.L.D.*

12.3–124 551.510.535:551.515.2

Mook, Conrad P. (*Diamond Ordnance Fuze Lab., Wash., D. C.*), **The apparent ionospheric response to the passage of hurricane Diane, (1955) at Washington, D. C.** *Journal of Geophysical Research,* Wash., D. C., 63(3):569–570, Sept. **1958.** 5 refs. **DLC**—Ionospheric response to the passage of hurricane "Diane" (1955) is related to the vertical distribution of divergence in the atmosphere, as observed over Washington, D. C., on Aug. 17 and 18, 1955. Extratropical cyclones originate at jet stream level in the atmosphere. *Subject Headings:* **1. Hurricane "Diane" (1955) 2. Ionospheric response.**—*N.N.*

12.3–125 **551.594.12**:551.510.535:551.515.4(54)

Rastogi, R. G. (*Physical Res. Lab., Ahmadabad*), **Thunderstorms and sporadic *E* layer ionisation.** *Indian Journal of Meteorology and Geophysics*, Delhi, 8(1):43–54, Jan. **1957.** 17 figs. (incl. photos), 18 refs. **DWB, DLC**—The paper describes the results of vertical P'-f recordings of ionospheric reflections carried out during the passage of thunderstorms over Ahmadabad. The thunderstorms were found to be accompanied by an increase in sporadic E ionization as shown by a rise in the maximum frequency of the Es or an increase in the intensity of reflection from Es. *Subject Headings:* **1. Sporadic E layer (Es) ionization 2. Thunderstorms 3. Ahmadabad, India.**—*Author's abstract.*

12.3–126 551.501.5:**551.510.535**:551.594.12

Rawer, K., **Information about the F2 layer taken from ionization maps.** (In: Physical Society of London, **Physics of the ionosphere,** London, Physical Society, **1955.** p. 270–275. 6 figs., 4 refs., 2 eqs. **DWB** (M10.535 C748)—The usual presentation of F2 data in ionization maps is a discontinuous one (system of four geomagnetic zones). A continuous presentation with two principal zones (chosen according to magnetic inclination) and two intermediate zones of linear interpolation may be considered as a first step to a continuous, world-wide presentation taking account of all existing data. The interpolation formula has been tested with the ionization maps obtained from the data. It has been recently modified according to these experiences and now makes use of three 'principal zones.' A method to reach a more complete presentation is indicated. The discussion in terms of 'local time' seems to be advantageous; further, presentation in universal time may be obtained by a simple transformation. It is emphasized that the use of observations obtained during the month in question is far from affording a satisfactory solution. There are two sources of information (an actual one and a theoretical one, the latter being the sum of past experience), and one should use both. Theoretical information will thus increase, thanks to practical prediction work. *Subject Headings:* **1. F2 layer 2. Ionization maps 3. Ionization data representation.**—*Author's abstract.*

12.3–127 **551.593.7**:535.51:**551.510.535**

Satyanarayana, R.; Bakhru, K. and Khastgir, S. R. (*all, Banaras Hindu Univ., Banaras*), **Polarization of the echoes from the Es and F regions.** *Journal of Scientific and Industrial Research, Sec. B*, New Delhi, 15(7):331–339, July **1956.** 8 figs. (incl. photos.), table, 13 refs. **DWB, DLC**—The polarization of the echoes from the Es and F regions, at night and in the early morning hours, has been studied using pulses of waves of frequency 3 Mc/s, at vertical incidence, and employing a polarized aerial system connected to a sensitive receiver. The oscillograms taken with the unpolarized receiver and the polarized receiving system showed, besides the sporadic E echo, which was of rapidly varying intensity and the magnetically split F echoes in different orders of reflection, a new type of reflection from the Es and F regions with an equivalent height, 2F-E. As this new type was found to be *left-handed*, it has been called the $M_0$ echo, as distinguished from the right-handed extraordinary M echo. Usually this echo was observed simultaneously with the sporadic E echo which was predominantly left-handed in polarization. A possible mechanism has been put forward to explain the occurrence of the left-handed M echo and the observed Es echo with a pronounced left-handed polarization, and a detailed discussion presented on the intensity and polarization of the observed F echoes. *Subject Headings:* **1. Radio echo polarization 2. Ionospheric radio wave reflection.**—*Authors' abstract.*

12.3–128 **551.510.535**:621.396.8

Schrag, R. L., **A method for studying large-scale irregularities in region E of the ionosphere.** (In: Physical Society of London, **Physics of the ionosphere.** London, Physical Society, **1955.** p. 202–211. 8 figs., table, 9 refs. **DWB** (M10.535 C748)—The present communication describes experimentally observed multiple-hop echo focusing phenomena due to E region irregularities. These phenomena, detected principally during winter nighttime hours, were of a transient nature with lifetimes ranging from 6 min to 50 min. An analysis, based on simple ray optics, indicates that the irregularities responsible for the focusing effects were 'large-scale,' and had radii of curvature of the order of 1000 km. Estimates of the probable dimensions are presented. The experiments were conducted at vertical incidence, utilizing 150 kc/s pulsed radio signals. *Subject Headings:* **1. Ionospheric disturbances 2. Ionospheric echoes 3. E region irregularities.**—*Author's abstract.*

## D2. GEOMAGNETISM

*See also:* **Earth current-geomag. relationships** (Hessler, Wescott), 12.3-175; **Magnetic obs., Bombay,** 12.3–229.

12.3–129 550.385.43

Mustel', E. R., **O fizicheskoĭ prirode razlichii mezhdu geomagnitnymi vozmushcheniiami s vnezapnym i postepennym nachalom.** [The physical nature of the differences between geomagnetic disturbances of sudden and gradual commencement.] *Astronomicheskiĭ Zhurnal,* Moscow, 34(1):120–126, Jan./Feb. **1957.** fig., 13 refs., eq. **DLC.** Transl. into English issued in *Soviet Astronomy AJ,* N. Y., 1(1):124–129, issued **1958.** fig. etc. **DLC** The differences between sudden commencement geomagnetic storms and nonsudden commencement storms are considered. The discussion shows that the ejection of condensations, leading to nonsudden commencement storms is evidently caused by some shortlived nonstationary process of electromagnetic nature in the region of sunspots. This process is always accompanied by peculiar phenomena of radio emission with a shift of the level of radio emission in the corona. It can be accompanied by chromospheric flares, but does not necessarily cause them. Disturbances with nonsudden commencement characteristics are caused by flocculi. This is confirmed by the fact that the passage of flocculi through the center of the sun's visible disk is accompanied by geomagnetic disturbances (7, 8). The difference in the character of sudden commencement and nonsudden commencement disturbances must be connected with differences in physical properties of the streams and not with their geometrical properties. Condensations causing sudden commencement disturbances have larger velocities than those causing nonsudden commencement disturbances; this influences the rapidity of the variations of the Earth's magnetic field (Formula 1). Besides, condensations, causing sudden commencement disturbances and ejected from the region of sunspots, have their own considerable "frozen" magnetic field. This should also cause additional variations of the Earth's magnetic field. Considerations show that the field of the condensations, causing nonsudden commencement disturbances should be much smaller than in the first case. *Subject Headings:* **1. Geomagnetic disturbances 2. Earth's magnetic field 3. Sudden commencements.**—*Author's abstract.*

12.3–130 550.38:061(47)

Kalinin, Iu. D., **Sovetskie issledovaniia po geomagnetizmu.** [Soviet investigations of geomagnetism.] *Priroda,* Moscow, No. 8:50–55, Aug. **1958.** 4 figs. **DLC**—The theoretical and practical value of geomagnetic studies is outlined. The importance of knowledge of magnetic deviations over continents in connection with aerial navigation, effect of magnetic storms on radio communication, etc., are discussed. Of 250 geomagnetic observatories participating in the IGY program, 50% were established especially for the IGY. Thirty-one of this total belong to the U.S.S.R.; these include some that are more than 100 years old (Leningrad, Sverdlovsk, Irkutsk), more recent ones (Ashkhabad, Bork, etc.) and several at high latitudes, such as the drifting ice stations in the Arctic, Severnyĭ Polius 6 and Severnyĭ Polius 7, and the first class observatory Mirny in Antarctica. The third Soviet artificial earth satellite contained a magnetometer and the Soviet research vessel "Zaria" is equipped with apparatus for recording continuously values of terrestrial magnetism during the movement of the vessel. By June 1958 the "Zaria" had crossed the Atlantic 6 times at different latitudes and had made measurements in the Indian Ocean. The Institute of Terrestrial Magnetism, in Moscow, one of the four world centers for collecting and distributing geomagnetic data, has been established. Present knowledge of the properties and origin of geomagnetic disturbances, the altitude at which electric currents in the ionosphere are distributed, the distance from the earth at which the ring electric current, situated in the equatorial plane, originates, the pulsatings of the geomagnetic field, etc., are discussed. *Subject Headings:* **1. Geomagnetic investigations 2. Magnetic deviations 3. Geomagnetism research reports.**—*I.L.D.*

12.3–131 551.380.2(99) 550.380.6

*Oldham, W. H., **Magnetic results from Mawson, Antarctica, 1955.** *Australia. Bureau of Mineral Resources, Geology and Geophysics, Report,* No. 39, **1958.** 10 p. 23 tables, 6 plates, 7 refs. **DLC**—This report describes the establishment of a Geomagnetic Observatory at Mawson, Antarctica, early in 1955, by the Commonwealth Bureau of Mineral Resources, Geology and Geophysics. The base established by the A.N.A.R.E. is briefly described and a detailed description is given of the observatory buildings and the instruments used. Hourly values and associated means of the magnetic elements (declination, horizontal intensity and magnetic intensity) are presented in tabular form for the period August to December, 1955. *Subject Headings:* **1. Geomagnetic data 2. Geomagnetic observatories 3. Mawson, Antarctica.** —*Author's abstract.*

12.3–132 91.04(984) 550.389.5(984)

*Karaczun, Konstanty and Kowalczuk, Jerzy, **Badania magnetyczne w Hornsundzie w lecie 1957 roku.** [Magnetic studies in the Hornsund, Spitsbergen, 1957.] *Przegląd Geofizyczny,* Warsaw, 3(2):175–183, **1958.** 3 figs., 3 tables. **DWB, DLC**—A preliminary report on magnetic measurements carried out by the magnetic group of the Polish expedition to Spitsbergen which included determinations of the component H, the declination D, and the inclination I, at 5 points on the coast of Hornsund fiord. The results are presented in a number of tables and charts. A final report will be presented after the full processing of observation data. *Subject Headings:* **1. Magnetic studies 2. Magnetic data 3. Hornsund, Spitsbergen.** —*A.M.P.*

12.3–133 550.381.21

Helm, H.; King, J. W. (*both, Dept. of Physics, Rhodes Univ.*), and van Wijk, A. M. (*Magnetic Obs., Hermanus, Union of South Africa*), **Measurements of magnetic declination during the solar eclipse of Oct. 23, 1957.** *Journal of Atmospheric and Terrestrial Physics,* London, 13(3/4):371–372, Feb. **1959.** fig., 2 refs. **DLC**—The results of measurements of magnetic declination during the eclipse at the Union Magnetic Observatory, Hermanus, 34°25.5′S, 19°13.5′E and at Rhodes Univ., Grahamstown, 33°18′S, 26°29.4′E did not show any noticeable eclipse effect as illustrated by the diagrams of westerly declinations resembling those obtained on control days. *Subject Headings:* **1. Magnetic declinations 2. Union of South Africa.**—*O.T.*

12.3–134 **551.510.535**:**551.594.13**:550.385.4

Hakura, Yukio; Takenoshita, Yugoro, and Otsuki, Toshiharu (*Hiraiso Radio Wave Obs., Radio Research Lab.*), **Polar blackouts associated with severe geomagnetic storms on Sept. 13, 1957 and Feb. 11, 1958.** *Japan. Science Council. Ionosphere Research Committee, Report of Ionosphere Research in Japan,* 12(4):459–468, **1958.** 7 figs., 18 refs. **DWB, DLC**—Examining through the world-wide ionospheric disturbances on Sept. 13, 1957 and Feb. 11, 1958, outstanding features of polar blackouts associated with severe magnetic storms have been discovered. A distinct region of abnormal ionization (usually called polar blackouts) appears in the polar region well before (about 20 hours) the onset of the geomagnetic storms. Such an ionized region builds up in the polar cap by the time of the sudden commencement (SC) of magnetic storm, and then spreads towards lower latitudes as the geomagnetic storm develops. A rather spiral-like pattern of the abnormal ionizing region is formed during the main phase of magnetic storm. Individual world-wide patterns of abnormal ionization, which are deduced from $F_{\min}$ data, are shown for the respective stages of magnetic storm. It is a quite remarkable fact that some corpuscular invasion exists in the polar cap well before the SC of magnetic storms without inducing any appreciable world-wide geomagnetic disturbance. Spiral precipitation of particles indicates a rather complicated mechanism of the corpuscular intrusion into the Earth's upper atmosphere, suggesting the revival of the old Birkeland-Störmer theory. Some discussions about these phenomena are also given. *Subject Headings:* **1. Polar blackouts 2. Geomagnetic storms 3. Corpuscular intrusion mechanism.**—*Authors' abstract.*

12.3–135 **551.510.535**:**551.594.13**:550.385

Fukushima, Naoshi (*Geophysical Inst., Tokyo Univ.*), **Three-dimensional consideration for current-system of geomagnetic variations, Pt. 1, Current flow for polar elementary storm**

**within a spherical conducting shell.** *Japan. Science Council. Ionosphere Research Committee, Report of Ionosphere Research in Japan,* 12(4):437–447, **1958.** 3 figs., 6 refs., 40 eqs. **DWB, DLC**—For the study of current-system for geomagnetic variations, the three-dimensional consideration of current distribution in the ionosphere is desirable. As a first step the current distribution in a stationary state produced by an electric dipole in a conducting shell bounded by two concentric spherical surfaces is considered, which may correspond to the case of a polar elementary storm. The result shows that the effect of the distribution of electrostatic charges at the boundary surfaces makes the electric current flow nearly along the spherical surfaces almost everywhere within the conducting shell except near the dipole, and a two-dimensional calculation hitherto made is approximately applicable. *Subject Headings:* **1. Geomagnetic variations 2. Current distribution in the ionosphere.**—*Author's abstract.*

## E. SOLID EARTH GEOPHYSICS

### E1. GENERAL GEOPHYSICS

12.3–136 91.04(235.24) 551.324.3

Marussi, A. (*Université de Trieste*), **Les résultats des recherches géophysiques de l'expédition italienne au Karakoroum, 1954–1955.** [Results of geophysical research of the Italian expedition in the Karakoram, 1954–1955.] *Ciel et Terre,* Brussels, 75(7/8):237–245, July/Aug. **1959.** 3 figs., 3 color plates. **DLC**—The Karakoram is one of the world's most important mountain ranges. It contains very high peaks of which the $K_2$ is the second highest in the world. A brief history is given of the various Italian expeditions in Karakoram since 1909 and the American expeditions since 1938. The author belonged to the Italian expedition of 1954 and he gives the first results of his gravimetric explorations. In order to determine the depths of the ice of the Baltoro Glacier he used two-methods: a) measurement of the superficial speeds of ice along a cross-section of the glacier; b) weight measurement along a cross-section of the glacier. The results obtained by the two methods agree and the maximum depth of ice is about 380 m. A chart shows a gravimetric plan of the zone examined by the expedition and the isostatic anomalies of Central Asia. The author explains these anomalies applying the isostatic theory. *Subject Headings:* **1. Italian Karakoram expedition, (1954–1955) 2. Baltoro Glacier 3. Gravimetric data 4. Ice 5. Karakoram Mts.**—*A.V.*

12.3–137 523.74:525.3

Danjon, A., **Variations saisonnière et aléatoire de la rotation de la Terre.** [Seasonal and stochastic changes in Earth's rotation.] *L'Astronomie,* Paris, 73(2):49–54, Feb. **1959.** 6 figs. **DLC**—Study of the fluctuations of Earth's rotation by means of determination of World Time made from July 1955, when the quartz clocks at the Observatory of Paris were linked up with atomic frequency-standards (caesium) and with the Atomichron functioning at Bagneux. Seasonal fluctuation recurs fairly faithfully from one year to another. Duration of the day is increased for 0.7 ms on March 12 and diminishes for 0.9 ms on July 1. In addition to this seasonal fluctuation, there exists a slow change which reached 0.6 s during the two years of observation. Evidence of possible influence of solar eruptions on Earth's rotation is given. *Subject Headings:* **1. Earth's rotation 2. Solar influences on seasonal rotation of earth.**—*A.V.*

12.3–138 550.379(436)

Friedl, Karl and Kantas, Karl (*both, Australian Oil Administration, Vienna*), **Geophysical results in Austria with special regard to telluric measurements.** *Geofisica Pura e Applicata,* Milan, 43:195–208, May/Aug. **1959.** 23 figs., 5 refs. **DWB, DLC.** German and English summaries p. 195.—This paper treats the results of telluric measurements in the Austrian Molasse-Zone and in the Vienna Basin, supplemented with data of other geophysical methods and deep-wells. The analysis of the results shows that the telluric method supplies not only a picture with good reconnaissance proceeding from which further, especially seismic, research can be planned more expediently, but can render good service in solving detailed problems too. The hypothesis concerning the anisotropy of sediments resp. its effect is verified by the results of model experiments. *Subject Headings:* **1. Telluric measurements 2. Geophysical measurements 3. Austrian Molasse-Zone 4. Vienna Basin, Austria.**—*Authors' abstract.*

## E2. GEOTHERMY

12.3–139 525.213:546.02:539.16

Safronov, V.S., **O pervonachal'noĭ temperature zemli.** [The primordial temperature of the earth.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 1:139–143, Jan. **1959.** 2 figs., 17 refs., 8 eqs. **DLC**—An examination of the mechanism of the growth of the earth as a result of the impingement of rudimentary stages of protoplanetary clouds upon its leads to the conclusion that the earth was formed practically completely in $10^8$ years. During this time the temperature in the center of the earth reached 1000°K. The heating was chiefly the result of the production of heat by the disintegration of radioactive elements and compressed substances during growth. Heating by collisions of bodies was comparatively slight. Further heating of the earth occurred as a result of the production of radioactive heat. Radioactive elements can heat the temperature of the earth to several thousand degrees in the course of 5 billion years. Such heating influences the evolution of the earth and especially the processes associated with the formation of the earth's crust. *Subject Headings:* **1. Earth's primordial temperature 2. Earth's crust formation.**—*Trans. of author's conclusion* (*I.L.D.*).

12.3–140 525.213

Cooper, L. R. and Jones, C. (*both, Mining Res. Estab., Natl. Coal Board, Worton Hall, Isleworth, Mx.*), **The determination of virgin strata temperatures from observations in deep survey boreholes.** *Geophysical Journal*, London, 2(2):116–131, June **1959.** 8 figs., 3 tables, 10 refs. **DWB, DLC**—When a survey borehole is drilled downwards from the surface of the Earth the temperature is disturbed by the circulating drilling fluid, but fluid and adjacent strata gradually attain the local virgin strata temperature when drilling is stopped. Temperature equilibrium is approached most quickly near the bottom of the hole where the time of disturbance has been the least. Observations of the fluid temperature at this position may be made over a period of a day during a normal week-end break in drilling. Cylindrical heat flow theory is used in this paper to show that, with a knowledge of the thermal properties of the fluid and surrounding strata, the virgin strata temperature at the depth reached can be calculated from such observations. New and inexpensive equipment using a thermistor temperature measuring probe has been developed for making the observations of temperature and it has been tested successfully down to depths of 1060 m (3480 ft) in Hopton Pool Borehole in the Cannock Chase area. The paper also describes the equipment and gives the virgin strata temperatures for the Hopton Pool Borehole. It also gives observations of the temperature of the borehole fluid at various depths taken on one day several days after the borehole drilling had ceased and shows that these could not be regarded as reliable measures of the virgin strata temperature. *Subject Headings:* **1. Strata temperatures 2. Borehole temperatures 3. Hopton Pool Borehole temperatures.**—*Authors' summary.*

12.3–141 541.124:547.455:551.525.2

Květ, Jan, **Stanovení půdních teplot metodou inverse sacharosy.** [The sucrose inversion method of measuring soil temperature.] *Československá Akademie Věd, II Celostátní Bioklimatologická Konference, Nov. 3–5, 1958*, issued Prague, **1960.** p. 381–386. 7 refs. English summary p. 385–386.—The rate of sucrose inversion depends—at constant pH- only upon temperature. Sucrose diluted in a citrate buffer solution, pH 2.9 to 2.5 is sterilized and filled into 10 to 20 ml glass ampules which are then exposed to outside temperatures for a certain period of time. The rate of sucrose hydrolysis into glucose and fructose (the so-called sucrose inversion) is determined polarimetrically. From the changes of sucrose concentration the exponential average temperature of the solution during the whole time of exposition can be calculated. This value is called the eT values and it always surpasses the arithmetical mean being more influenced by high than by low temperatures. The sucrose inversion method (Invertzuckermethode according to KUNDLER), was invented by PALLMANN et al. in 1940; hitherto it has been used mostly for measuring soil temperature and several applications of this method are shown in this communication. According to the experience of PALLMANN et al., of KUNDLER and of several Czech authors, the results of the sucrose inversion method measurements are quite reliable. Even slight temperature differences can be revealed despite of whether the measurement is carried out under extremely differing conditions (e.g., in mountains, *see* PALLMANN et al., or JENIK) or at habitats of a more temperate character (e.g. in the soils of Central European forests, KUNDLER, J. KVĚT (unpubl.), M. DŽATKO (unpubl.)). Soil and soil surface temperatures can be measured on larger or smaller areas. The latter is the case with SLAVIK, SLAVIOVÁ and JENIK and with KUNDLER who have investigated the effects of various silvicultural treatments on soil temperature. The author of this communication and M. DŽATKO (unpublished), on the other hand, have compared data obtained simultaneously at habitats even 20 to 30 mi apart. Temperature conditions of whole forest or meadow communities (unpublished results of J. KVĚT, E. BALÁTOVÁ) as well as of stands of a single species (M. DŽATKO (unpubl.) and SMETÁNKOVA) can be characterized using this method. The sucrose inversion method has been used also in field experiments as a simple means of evidence of soil temperature at different plots (SMETÁNKOVA, N. AVRATOVŠČUKOVÁ (unpubl.)). When extreme and not average temperatures are the most important factor the sucrose inversion method can be misleading. Thus the eT values of a habitat where temperature inversion occurs need not differ from those of the surrounding area, as has been reported by B. SLAVIK (unpubl.). According to the author's experience the best results are obtained with media whose temperature does not change too quickly. The sucrose inversion method of measuring soil and soil surface temperatures seems to have a special importance for various branches of ecology. Not only can a number of measurements be carried out simultaneously but the integrative character of the method makes it also a useful device in the hands of an ecologist interest in comparing temperature conditions characteristic of various habitats. *Subject Headings:* **1. Soil temperature measurements 2. Sucrose inversion methods.**—*Author's abstract.*

12.3–142 550.3:622.241

Roman, Lucjan, **Badania geofizyczne w otworze Krynki IG 1.** [Geophysical investigations in the Krynki borehole IG 1.] *Warsaw. Instytut Geologiczny, Biuletyn,* No. 128:5–26, **1957.** 10 figs., 5 refs., 3 charts (fold. in pocket). Russian and English summaries p. 25–26. (Subseries *Seria Geofizyczna,* No. 17) **DWB**—Basing on the measurements, executed in the Krynki borehole, of the apparent electrical resistivity of the rocks, their spontaneous polarization potentials and their radioactivity intensity, the individual zones and rock complexes have been worked out for the above mentioned borehole profile. The measurements of the apparent electrical resistivity of the rocks, by four and five different spacings of the electrodes of the lateral sonde, as well as the measurements of the naturally occurring polarization potentials on two different, sometimes far distant, dates—made it possible to draw conclusions regarding the value of the true resistivity of the rocks and their porosity and to advance an hypothesis on the incomplete saturation with water of certain porous rocks in the borehole profile and the changeable character and magnitude of the naturally occurring rock potentials in time. The three above mentioned parameters of the physical properties of the rocks together with geological data, served as a basis for the completion of the lithological profile of the borehole in those sectors where the core was lacking, or the obtained samples were of no value. It permitted also a more definite statement of the boundaries of the individual beds. The task of the author consisted in contributing to the end result of the geophysical methods of investigation of boreholes—i.e., obtaining definite informations on the structure of the geological profile of the borehole, without the obtaining of the borehole core. *Subject Headings:* **1. Borehole profiles 2. Krynki borehole IG 1 3. Lithological profiles.**—*Author's abstract.*

12.3–143 551.21

†Imbò, G. **Temperature d'irrigidimento e viscosità magmatica.** [Solidification temperature and viscosity of magma.] *Associazione Geofisica Italiana, 7th Rome, Nov. 1957. Atti,* pub. Rome, (**1958?**) p. 53–60. 4 figs., 18 refs., 6 eqs.—Magmatic temperatures are used to determine the coefficient of magmatic viscosity for Vesuvius and Etna as $10\times10^4$ and $0.8\times10^4$ respectively, based on means of measurements made in 1936 and 1944 for Vesuvius and 1923, 1947 and 1950 for Etna. Data and calculations are shown in curves and explained theoretically. *Subject Headings:* **1. Magma temperature 2. Magma viscosity coefficient 3. Etna 4. Vesuvius.**—*M.R.*

12.3-144 525.213:551.14:551.241

Kabuzenko, S. N., **K teorii temperaturnykh deformatsiĭ zemnoĭ poverkhnosti.** [Theory of thermal deformations of the earth surface.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 3:445–449, March **1959.** 4 refs., 27 eqs. **DLC**—The theory of deformation of the earth associated with the daily variation of temperature is examined. Beginning with the thermal elasticity equations describing the temperature deformation of the earth the author demonstrates the derivation of equations for determining linear deformation and inclination of earth's surface. From analysis of the solution with the aid of data on daily temperature amplitude it is concluded that daily variations of inclination and of linear deformation of the earth's surface are caused by uneveness in heating; the observed daily deformation of the earth is a narrow local process touching only its uppermost layers; and the retardation of daily temperature inclinations of the earth's surface are explained by the presence of layers of friable heat insulating substances on the surface of the earth. *Subject Heading:* **1. Thermal deformation of earth's surface.**—*I.L.D.*

12.3–145 536.51:536.45

Boyd, F. R. and England, J. L. (*Carnegie Inst. of Wash., Wash., D. C.*), **Apparatus for phase-equilibrium measurements at pressures up to 50 kilobars and temperatures up to 1750°C.** *Journal of Geophysical Research*, Wash., D. C., 65(2):741–748, Feb. **1960.** 6 figs., 2 tables, 7 refs. **DLC**—Construction and calibration of apparatus utilizing a solid pressure medium for phase-equilibrium studies at elevated temperatures and pressures are described. Pressure calibration is carried out by measurement of the Bi I–Bi II and Tl II–Tl III transitions. A new determination of the thallium transition, 37.1±1.3 kilobars, is given. Tests indicate that talc is superior to pyrophylite and boron nitride as a solid pressure medium for high-temperature work. *Subject Headings:* **1. Phase-equilibrium studies 2. Thallium transition.**—*Authors' abstract.*

12.3–146 551.14:551.24

†Gast, Paul W. (*Dept. of Geology, Univ. Minnesota*), **Limitations on the composition of the upper mantle.** *Journal of Geophysical Research*, Wash., D. C., 65(4):1287-1297, April **1960.** 5 tables, 50 refs., 5 eqs. **DLC**—New determinations of the isotopic composition of strontium and of the concentration of K, Rb, Cs, Sr, and Ba rocks and meteorites are given. The isotopic abundance of $Sr^{87}$ in the upper mantle and the crust appears to be lower than that found for chondrites. Furthermore, for a chondritic earth model, the concentrations of potassium, rubidium, and cesium in the earth's crust are anomalous when compared with those of uranium, barium, and strontium. These two concurring arguments indicate that the upper mantle and crust of the earth do not contain K, Rb, Cs, U, Ba, and Sr, in the proportions found in chondrites, and that the alkali metals are depleted relative to U, Sr, and Ba. This depletion may be an indication of a nonchondritic earth composition; it may also result from an earth differentiation in which K, Rb, and Cs were concentrated or retained in the lower mantle. *Subject Headings:* **1. Earth models 2. Earth's composition 3. Isotopic content of earth's mantle and crust 4. Isotopic content of meteorites.**—*Author's abstract.*

12.3–147 **551.525.4:551.525.5**

Goguel, Jean, **Influences des variations de la température superficielle sur le degré géothermique, en particulier dans le cas d'un sol gelé permanent.** [Influence of surface temperature variation on the geothermal degree, especially in permafrost soil.] *Annales de Géophysique*, Paris, 12(3):183–201, **1956.** 9 figs., 6 refs., 15 eqs. French and English summaries p. 183. **DLC**—In view of interpreting the very high values of the thermal gradient recently obtained in the permafrost, the changes due to it in the propagation of variations in surface temperature are calculated here and it is shown that the gradient is exaggerated by its existence. Reference is made to the calculation for a homogeneous soil. It is suggested that the variations of the temperature during the upper quaternary could have had a greater influence on the gradients than is commonly admitted, and that the exact value of the geothermal flux cannot be determined without due allowance for these variations. *Subject Headings:* **1. Thermal gradient 2. Surface temperature variations 3. Permafrost temperatures.**—*Author's abstract.*

12.3–148 551.24:551.525.4:550.382.3

†Shimazu, Yasuo (*Nagoya Univ.*), **A thermodynamical aspect of the earth's interior—physical interpretation of magmatic differentiation process.** *Nagoya. Univ. Institute of Earth Sciences, Journal,* 7(1):1–34, March **1959.** 20 figs., 20 refs., 79 eqs. English summary p. 1.—A concept of thermodynamical coupling is presented for a study of the earth's interior. Terrestrial phenomena (geophysical, geochemical and geological) are considered to interact with each other by material and heat transfers. The minimum rate of entropy production is assumed for these phenomena and the thermodynamics of steady state is applied. The coupling mechanism is classified as diffusion- and squeezing-types. The former is realized in global phenomena where the whole earth is included while the latter is in local phenomena. Both of them have the character of a self-sustaining engine. Concepts of regional metamorphism and isostasy are described by thermodynamic coupling. A stability of thermodynamic coupling of a two-phase system is discussed in relation to a possibility of existence of convection currents within the mantle of the earth. A reaction accompanying with a positive volume change and a positive heat of reaction facilitates the convection. Following the same way, magmatic differentiation processes are studied quantitatively. A relation between physical conditions and variations of crystal composition during the differentiation is our main interest. A perfect continuous series of binary system is studied and the results obtained are applied to the olivine and plagioclase. The discussion is reduced to solve a diffusion equation with a moving crystal-melt interface. The moving velocity of interface or the growth rate depends upon a freezing rate, a convection velocity within melts, and a gravitational sinking velocity of crystals. A convection in a sill-type intrusion is also studied. The natural conditions seem to be unfavorable for the convection. A horizontal temperature gradient in dyke-type intrusion tends the apparent diffusivity to increase. The zoning phenomenon of plagioclase is assumed to be due to a rapid change of freezing rate and is quantitatively analyzed. *Subject Headings:* **1. Magmatic differentiation 2. Convection currents 3. Eutectics 4. Regional metamorphism 5. Earth's interior.**—*Author's abstract.*

12.3–149 551.511:550.311:529

†*Quiring, H. (*Technische Univ. Berlin*), **Die Wärmebilanz der Erde als Grundlage einer absoluten Zeitrechnung.** [The heat balance of the earth as a basis for an absolute chronology.] *Beiträge zur Geophysik,* Leipzig 61(3):125–143, **1951.** fig., 9 tables, 35 refs. **DWB**—Data on heat gain and loss of the earth are presented for various stages of the earth's development. The components analyzed and computed include: initial temperature of the earth; insolation; heat produced through formation of various chemical compounds, changes in state of aggregation of various substances, dissociation of radioactive minerals. Heat losses of the earth as calculated on the basis of conductivity are compared with results obtained from application of the Stefan-Boltzmann formula. The total age of the earth is put at slightly above 5 billion years. *Subject Headings:* **1. Chronology 2. Heat balance 3. Age of earth.**—*G.T.*

## E3. VOLCANOLOGY

12.3–150 551.234

Contini, C., **Elementi per una teoria dei giacimenti di vapore naturale.** [Elements of a theory of natural steam beds.] *Annali di Geofisica,* Rome, 10(1/2):49–59, **1957.** 43 eqs. Italian and English summaries p. 59. **DLC**—The general formulas are given according to which steam is known to flow through porous means and the possible balance conditions of natural underground steam beds are discussed. Although such beds may form in all sorts of soil structures, including those opened in all directions, the fact has been established that no large-size formations may occur unless the upward development of the bed is limited by the presence of some impermeable layers arranged horizontally or at a small angle with the horizontal. The balance-upsetting effects exerted on these steam beds when one or more wells are drilled to exploit them are discussed. Finally, such conclusions are drawn as may be of a practical interest in locating and exploiting underground steam formations. *Subject Heading:* **1. Hot springs.**—*Author's abstract.*

12.3–151 551.21:550.341(675)

Berg, Edward (*Lwiro, Belgian Congo*), **Volcanic eruption in Belgian Congo.** *Journal of Geophysical Research*, Wash., D. C., 64(5):580, May **1959.** **DLC**—The volcanic eruptions of Nyamuragira in eastern Belgian Congo, lasting from Aug. 7 to Nov. 21, 1958, and observed by the Rumangabo seismographic station (operated jointly by the Institut pour la Recherche Scientifique en Afrique Centrale and the National Parks of the Belgian Congo) are described as one of the most important eruptions in the last half century. A swarm of small earthquakes up to 2.6 magnitude preceded the eruption by some three hours which continued from the stopping of volcanic activity to the beginning of the main eruption on Aug. 10. "The variation of maximum trace amplitude of the sinusoidal earth tremors . . . revealed periods of 20 to 25 days, corresponding to the eruptive activity." The lava outflow measured 20 km, the maximum outflows were about 50 m/sec. *Subject Headings:* **1. Volcanic eruptions 2. Nyamuragira Volcano 3. Belgian Congo.**—*O.T.*

12.3–152 551.21(469.9)

**Ein Vulkanausbruch im Azorengebiet.** [Volcanic eruption in the Azores area.] *Wetterlotse*, Hamburg, No. 132:142, July **1958.** **DWB**—M/S"Brandenstein" reports the following for April 20, 1958: "At 1030 GMT bearings were taken at 349.11 naut mi off a volcano eruption. Our position is 38°24′5″N, 28°47′0″W. Eruption seemingly increases. Height measured by sextant 1100 m. White cloud with ash showers." *Subject Headings:* **1. Volcanic eruptions 2. Azores.**—*W.N.*

## E4. SEISMOLOGY

*See also:* **Seismology, China** (Needham, Ling), 12.3–10; **Seismic activity, Garm region** (Gzovskiĭ et al.), 12.3–161; **Crustal structure from seismic measurements** (Woollard), 12.3–214.

12.3–153 534.1/2

†Band, William (*Dept. of Physics, Wash. State Univ., Pullman*), **Studies in the theory of shock propagation in solids.** *Journal of Geophysical Research*, Wash., D. C. 65(2):695–719, Feb. **1960.** 9 figs., 2 tables, 18 refs., 130 eqs. **DLC**—In Pt. I a single-parameter visco-elastic model of a shear-yielding solid is defined for which a permanent-regime solution of the equations of motion exists for any finite compression. The 'profile' of this compression as a function of distance is obtained in the form of an integral which can be evaluated when the velocity of propagation is known as a function of final compression. It is assumed that the permanent-regime solution approximates actual shock waves, and that the velocity of the permanent-regime profile equals the shock velocity. Observed shock speeds are used to compute shock profiles in a number of metals. The maximum slope of the profile for any one metal increases with increasing compression. The limiting value of the maximum slope as the volume is extrapolated to zero gives a numerical estimate of the viscosity parameter, and this has been done for Al, Pb, Sn, Zn, and Zr. In Pt. II Zener's linear theory of anelasticity has been generalized to materials with cubic crystal structure. The theory of the propagation and attenuation of plane waves, both longitudinal and transverse, along a principal axis of the crystal is presented. The combined effects of relaxation mechanisms and thermal diffusion are included. The significance of the results for the theory of shock propagation are discussed and several questions are raised for later discussion. In Part III the general equations for propagation of steady-state compression profiles in shear-yielding, heat-conducting, anelastic solids are given. Methods of solution by successive approximation are developed for Hookean solids, with both adiabatic and isothermal (very steep) profiles, and for non-Hookean solids with shock profiles. The results of Part I are corrected to include the effects of thermal conductivity and anelasticity. Heating aftereffects of shocks are discussed, including the effects of irreversible heating due to viscous yielding, etc., and it is shown how the temperature of the solid after a passage of shock profile may be calculated. *Subject Headings:* **1. Shock propagation in solids 2. Plane waves 3. Thermal conductivity.**—*Author's abstract.*

12.3–154 550.34:532.59

†Gutenberg, Beno (deceased), **The shadow of the earth's core.** *Journal of Geophysical Research*, Wash., D. C., 65(3):1013–1020, March **1960.** 4 figs., 3 tables, 25 refs., 2 eqs. **DLC**

—There is very good agreement between the observed decrease in amplitudes of longitudinal waves diffracted at the boundary of the earth's core and corresponding theoretical results. Especially, no rapid decrease of amplitudes at the beginning of the shadow zone is to be expected. Theory and observations show that the amplitudes of diffracted short-period P waves decrease faster with distance in the shadow zone than those of longer waves. At epicentral distances of over 110° short-period diffracted P waves emerge gradually and their beginning can rarely be ascertained. Corresponding long-period waves arrive within the limits of error at the time calculated on the assumption of a straight-line travel-time curve. Amplitudes of waves diffracted from a caustic decrease rapidly with distance; this usually limits the range of their observation to roughly 10°. On the contrary, amplitudes of P waves diffracted at the core may be visible on records of a great earthquake at distances of 103° to 180°. Observations for diffracted S waves cover a much smaller range of distances, since S waves appear in a portion of seismograms which is disturbed by earlier motion. Otherwise, observations indicate similar behavior for diffracted P and S waves. *Subject Headings:* **1. Shadow of the earth's core 2. Diffracted P and S waves.**—*Author's abstract.*

12.3–155 551.24:550.341.6

†Gutenberg, Beno, **Wave velocities below the Mohorovičić discontinuity.** *Geophysical Journal*, London, 2(4):348–352, Dec. **1959.** fig., 2 tables, 28 refs., 2 eqs. **DWB, DLC**—The velocities of longitudinal waves immediately below the Mohorovičić discontinuity which have been found by various authors for continental regions decrease on the average from about 8.2 km/s, if the Mohorovičić discontinuity is at a depth of 30 km, to about 8.0 km/s, if it is at a depth of 50 km. The rate of this decrease in velocity of 0.011 0.0016 km/s per km is statistically significant and exceeds appreciably the critical rate of about 0.0013 km/s per km, required for a low-velocity channel. The corresponding calculated average decrease in the velocity of transverse waves from about 4.64 km/s, if the Mohorovičić discontinuity is at a depth of 30 km, to about 4.56 km/s, if it is at 50 km (at a rate of 0.004, 0.0056 km/s per km) can be expected to represent average conditions under continents only if this decrease in velocity is considered in connection with that for longitudinal waves. For a depth of about 60 km, both calculated velocity-depth curves connect smoothly with those found by the author from the apparent velocities at the points of inflection of travel-time curves for earthquakes originating at various depths. The new results confirm the hypothesis that under continents the asthenosphere low-velocity channel starts at the Mohorovičić discontinuity. *Subject Headings:* **1. Asthenosphere 2. Low-velocity channel 3. Mohorovičić discontinuity.** —*Author's abstract.*

12.3–156 532.59:551.21:534.321.9

Iida, Kumizi and Kumazawa, Mineo (*both, Nagoya Univ.*), **Measurements of elastic wave velocities in volcanic rocks at high temperatures by means of ultrasonic impulse transmission, Pt. 1.** *Nagoya. Univ. Institute of Earth Sciences, Journal*, 7(1):49–64, March **1959.** 10 figs. (incl. photos), 3 tables, 18 refs., eqs. English summary p. 49.—A new method of measurement for elastic wave velocities in rocks at high temperatures by means of ultrasonic impulse transmission is presented. This method consists of the direct measurement of wave velocities by utilizing the piezoelectricity of a beta-quartz crystal. It is shown that there are several kinds of cut in the orientation of a beta-quartz crystal generating or receiving the longitudinal or transversal wave, or both waves. In our experiments, these beta-quartz crystal cuts did not change in phase to tridymite at 870°C, presumably due to a sluggish inversion. The efficiencies of transducers were not reduced even at 870°C, and the measurement could be made up to about 1000°C. Thus there is a possibility of using direct measurements for high temperatures above 1000°C. The rock specimens used are all volcanic rocks which were collected from several localities: Mihara Volcano, Izu Oo-shima; Showashinzan and Usu Volcanoes, Hokkaido; Hakone Volcano, Kanagawa Prefecture; Shidara Volcano, Aichi Prefecture. Some of the results obtained are noted below: 1) Longitudinal and transversal wave velocity through volcanic rocks from Showa-shinzan and Mihara Volcanoes increases with a rise in temperature up to about 800°C, while that through volcanic rocks from Shidara and Hakone volcano decreases with a rise in temperature. The longitudinal wave velocity generally varies more than the transversal wave velocity. 2) The increase of elasticity with a rise in temperature seems to be a characteristic of the recently erupted new volcanic rocks, while the decrease of elasticity is observed in the old volcanic rocks. This seems to be mostly due to the differences in the structures of volcanic roacks. 3) The increase of Poisson's ratio with a rise in temperature is generally remarkably large. *Subject Headings:* **1. Ultrasonic impulse transmission 2. Elastic wave velocity measurements 3. Phase-equilibrium studies 4. Volcanic rocks.**—*Authors' abstract.*

12.3–157 550.342:551.509.318

†Jensen, Henry, **A procedure for the determination of direction of approach of microseismic waves.** *Denmark. Geodaetisk Institut, Meddelelse,* No. 36, **1958.** 18 p. 9 figs., 2 tables, 21 refs. French and German summaries p. 3. **DWB**—The method described for determination of the directional approach of microseismic waves is valid if (1) the waves contains a considerable Rayleigh-component, and (2) if any other wave types of the movement are statistically independent of the Rayleigh wave. A set of homogeneous Galitzin-Wilip instruments whose Z, N, and E response curves and phase lag are (almost) the same was used in Copenhagen and at Kiruna, whereas at Uppsala they used a long-period Benioff. Test runs of Oct. 25, 1957 are tabulated individually, and the "law of the empty half-plane" is demonstrated. Vector means of the north toward east bearings were: Copenhagen −6°±5°, Uppsala −44°±3°, Kiruna −84°±6°. Synoptic situation is given for this and other examples of the method applied. Plottings and graphical presentations of the results are included. *Subject Heading:* **1. Microseismic waves forecasting.**—*W.N.*

## E5. TECTONICS—CONTINENTAL DRIFT

12.3–158 551.241

†Longwell, Chester R. (*1820 Mark Twain St., Palo Alto, Calif.*), **My estimate of the continental drift concept.** (In: Tasmania. Univ. Geology Dept., **Continental drift: a symposium, March 1956.** Hobart, Univ. of Tasmania, **1958.** p. 1–12. 22 refs.) **DWB**—Facts concerning this controversial concept are set forth in an interesting and clear manner. The approach adopted is to steer away from extremes, either exaggerating the scientific validity of the concept or emphatically rejecting it. The concept of the moving continents is treated strictly as a hypothesis and accordingly the discussion consists of a critical analysis of the currently known evidence. Since the facts, principles, and techniques, with bearing on this problem, relate to the fields of geophysics, geodesy, palaeontology and physical geology, the pertinent facts in these fields are examined. Following the examination it is concluded that the evidence thus far available is only suggestive and circumstantial. In order to satisfactorily establish the hypothesis more and concrete evidence is desired. *Subject Heading:* **1. Continental drift hypothesis.**—*I.S.*

12.3–159 525.14:551.11:551.241

King, Lester (*Univ. of Natal, Durban*), **New reconstruction of Laurasia.** (In: Tasmania. Univ. Geology Dept., **Continental drift: a symposium, March 1956.** Hobart, Univ. of Tasmania, **1958.** p. 13–23. fig., 15 refs.) **DWB**—A fresh reconstruction of Laurasia is described and graphically presented as important evidence in establishing the validity of the continental drift hypothesis. This reconstruction shows that Laurasia was a very compact mass which included all the areas of the northern continents in one land mass. The facts concerning the distribution in space and time of the Palaeozoic orogenic belts about the Arctic and North Atlantic Oceans are examined at length to test the validity of this reconstruction. It is concluded that so many breaks in this pattern of mountain chains where the rocks and structures depart into the Atlantic (and Arctic) Ocean and are known no more, become comprehensible if Laurasia was assumed to be a single mass. *Subject Headings:* **1. Continental drift hypothesis 2. Laurasia.**—*I.S.*

12.3–160 91.04(58) 550.341.6:551.24

Gal'perin, E. I., **Izuchenie stroeniia zemnoĭ kory v oblasti perekhoda ot Aziatskogo kontinenta k Tikhomu okeanu.** [Study of the structure of the earth's crust in the transitional area from the Asiatic Continent to the Pacific Ocean.] *Akademiia Nauk SSSR. Mezhduvedometvennyĭ Komitet po Provedeniiu MGG (IGY). Informatsionnyĭ Biulletin'*, No. 5:68–73, **1958.** 5 refs. **DWB**—A brief account of the Pacific Ocean Interdisciplinary Geological-Geophysical Expedition in the summer of 1957 for studying the bottom structure of the earth's crust in the transitional zone between the Asian continent and the Pacific Ocean. In 1957 investigations were carried out on the Komandorskiĭ Islands, Kamchatka, the northwest coast of the Sea of Okhotsk and Sakhalin. The geophysical investigations involved the use of seismic, gravimetric and magnetic techniques. The seismic observations were made with the method of deep seismic soundings which consists of moving explosion points and fixed recording stations in the ocean and also the combination of marine and land observations. The aerial magnetic surveys were made with a hydroplane 2000 above sea level. Geological observations were made for determining the history of tectonic development, and contemporary structure of a region and the appearance of tectonic movements and their comparison with seismicity. The participants in the various types of investigations are listed, the specific areas of investigations are itemized, and some of the findings are presented. *Subject Headings:* **1. Earth's crust 2. Geophysical expeditions 3. Komandorskiĭ Islands 4. Kamchatka 5. Sea of Okhotsk 6. Sakhalin.**—*I.L.D.*

12.3–161 550.34:551.24

†Gzovskiĭ, M. V., Krestnikov, V. N., Nersesov, I. L. et al., **Sopostavlenie tektoniki s seĭsmichnost'iu Garmskogo raĭona Tadzhikskoĭ SSSR, II.** [Comparison between the tectonics and seismological activity of the Garm area of Tadzhik S.S.R., Pt. 2.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 12:1425–1442, Dec. **1958.** 8 figs., 3 tables, 28 refs., 2 eqs. **DLC**—The contents of this paper comprise the following, viz: comparison of tectonics with the distribution of earthquake centers in space; mean magnitude of the velocity gradient of vertical tectonic movements of the earth's crust; comparison of the mean graidne of velocity of tectonic movements for the Quaternary Period with contemporary seismic activity in the Garm area and comparison of seismic with tectonic district adjacent to the Garm area. *Subject Headings:* **1. Earthquake centers 2. Seismic activity 3. Tectonic movements 4. Garm, Tadzhik S.S.R. I. Reisner, G. I.**—*I.L.D.*

12.3–162 550.341.6:551.24

Scheidegger, A. E. (*Calif. Inst. of Tech., Calif.*), **Note on the tectonics of Kern County, California, as evidenced by the 1952 earthquakes.** *Journal of Geophysical Research*, Wash., D. C., 64(10):1499–1501, Oct. **1959.** 2 figs., 5 refs. **DLC**—A statistical analysis has been made of the mechanisms of the aftershocks of the Kern County, Calif., earthquake of July 21, 1952. A method the writer developed earlier shows the direction of tectonic motion to be at N 32°W, approximately normal to the strike of the White Wolf fault. This is in agreement with Gutenberg's fault-plane solution for the main Kern County earthquake which yielded an overthrust in a northwesterly direction. It therefore appears that the Kern County earthquake and its aftershocks were caused by the same tectonic effects. *Subject Headings:* **1. Earthquakes 2. Tectonic effects on earthquakes 3. Kern County, Calif.**—*Author's abstract.*

12.3–163 551.241

†Carey, S. Warren, **The tectonic approach to continental drift.** (In: Tasmania. Univ. Geology Dept., **Continental drift: a symposium, March 1956.** Hobart, Univ. of Tasmania, 1958. p. 177–355. 51 figs., 71 refs.) **DWB**—An exhaustive, systematic and important paper setting forth an original theory of global expansion based on the orocline hypothesis. Numerous maps, including maps printed in color showing the geotectonic structure of different regions of the earth, illustrate the study. The conclusions of the paper support the drift hypothesis by giving a plausible explanation for major crustal deformation. This is done by introducing the idea of the orocline as a major tectonic feature. The main body of the paper, therefore, consists of an orocline analysis of the earth. However, the orocline study of the earth leads to a smaller globe implying that the earth of Pangaea was not of the same size as the earth of today. This difficulty can be removed by assuming that the earth is expanding and, therefore, the present day globe is larger than that of Pangaea. *Subject Headings:* **1. Con-**

**tinental drift 2. Global expansion 3. Orocline hypothesis of global expansion 4. Crustal deformation theories.**—*I.S.*

12.3–164 551.242:525.213

†Subbotin, S. I., **O prichinakh vertikal'nykh dvizheniĭ Zemnoĭ kory.** [Causes of vertical motions of the earth's crust.] *Lietuvos TSR Mokslų Akademija. Geologijos ir Geografijos Institutas, Moksliniai Pranešimai*, 5:5–20, **1957.** 6 figs., 22 refs. **DWB**—Based on the examples of anomaly of gravity in the regions of the Black Sea, the Mediterranean and other seas, the author concludes that the main cause of the motion of the earth's crust are expansion and compression of the undercrust material and not its transflow. The expansion and compression are stimulated by polymorphic changes of the undercrust material at high temperature and pressure. It is stated that polymorphic changes may proceed at small changes of temperature if the conditions are close to the critical temperature and pressure of such transition. The changes of temperature are due to exogenic as well as endogenic causes. *Subject Headings:* **1. Vertical motion of earth's crust 2. Earth's crust.**—*Author's abstract.*

12.3–165 550.34:534.64:551.241(476)

Ryng, S. I., **Glubinnoe geologicheskoe stroenie territorii Belorussii po dannym geofizicheskikh issledovaniĭ.** [Geological structure at great depths in White Russia according to data from geophysical investigations.] *Lietuvos TSR Mokslų Akademija. Geologijos ir Geografijos Institutas, Moksliniai Pranešimai*, Vol. 3. Geofizika, Hidrologija, issued Vilna, **1956.** p. 49–55.—A summary of the results of seismographic and electric exploration of the earth in the Byelorussian S.S.R. The seismographic studies involved the method of initial penetration and the method of correlating refracted waves; the geoelectric studies were based upon vertical sounding with maximum scatter AB of 6–16 km. The author describes the properties of the geoelectric cross section, the principal features of the geoseismic cross section, the relief of the crystalline foundation and the geological structure of the sedimentary layers in the Byelorussian part of the Dnieper-Donetz depression. *Subject Headings:* **1. Earth's interior 2. Geophysical surveys 3. Byelorussian S.S.R.**—*I.L.D.*

12.3–166 550.341(65)

Dubourdieu, Georges, **Tectonique et tremblements de terre en Algérie du Nord.** [Tectonics and earthquakes in North Algeria.] *Academie des Sciences, Paris, Comptes Rendus*, 250(5):884–886, Feb. 1, **1960.** 4 refs. **DWB, DLC**—Study of the relationships between geologic displacements and the seisms recorded in Algeria, based on a hundred earthquakes observed from 1716 to 1954. The geologic displacements have occurred following a general North–East–South–West direction. The plotting of the seisms on a chart, taking into account their intensity, shows ten peak seismicity spots, five of which correspond exactly to axes of transverse dislocation. The places situated on the transversals have three times as many chances as other points of the Algerian territory of belonging to zones of maximum seismicity. *Subject Headings:* **1. Earthquakes 2. Seismicity distribution distribution 3. Algeria.**—*A.V.*

12.3–167 550.83:778.35:551.579

Béranger, Jean-Claude, **Nouveaux critères d'interprétation en photogéologie.** [New interpretation criteria in photogeology.] *Académie des Sciences, Paris, Comptes Rendus*, 248(24): 3460–3461, June, **1959. DWB, DLC**—The "moisture zones" of soils appear on photographs as a grey tint distinctly darker than the surrounding soil. Owing to this, the tectonic diagram of a region, even if entirely devoid of outcrops, can be obtained through interpreting the moisture zones in soils. Tests have been made in granitic soil in the Haute-Vienne Department. The results are corroborated by excavations, borings and mining. *Subject Headings:* **1. Photogeology 2. Moisture zones in soil 3. Tectonic diagram determination.**—*A.V.*

12.3–168 551.24

Crea, Antonio, **Applicazioni tettonofisiche nella città di Perugia.** [Tectonophysical applications in the city of Perugia.] *Geofisica e Meteorologia*, Genoa, 7(1/2):37–41, Jan./April **1959.** 7 figs., 2 tables, 2 eqs. English summary p. 41. **DWB**—The landslide phenomenon in the western part of the town of Perugia is examined from geological and lithological points of view. The possible causes are investigated, and an approximative static calculation is given as a starting point for a rational improvement process. *Subject Headings:* **1. Landslides 2. Tectonics 3. Perugia, Italy.**—*Author's abstract.*

12.3–169 551.14:551.241

Gzovskiĭ, M. V.; Krestnikov, V. N. and Reĭsner, G. I., **Geologicheskie metody kolichestvennoĭ kharakteristiki srednego gradienta skorosti vertikal'nykh tektonicheskikh dvizheniĭ (izmeneniĭ naklona) zemnoĭ kory i nekotorye rezul'taty ikh primeneniia.** [Geological methods of quantitative characteristics of the mean velocity gradient of vertical tectonic movements (changes in slope) of the earth's crust and some results of their application.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 8:1147–1156, Aug. **1959.** 7 figs. (1 fold), 2 tables, 13 refs., 5 eqs. Russian summary p. 1147. **DWB, DLC**—Geological methods, indicating changes in the surface of the earth slopes and in different level of sediments in the earth's crust during long periods (millions of years) are described with graphs and two maps. One map represents vertical displacements in Eastern Europe and another, diagramatic deformation of the pretertiary surface leveling in the northern Tien Shan Mts. during Neocene and Quaternary periods. Mean value of velocity gradients of vertical tectonic movement are given in tables and graphs. *Subject Headings:* **1. Tectonics 2. Earth's crust 3. Eastern Europe 4. Tien Shan Mts.**—*N.P.S.*

12.3–170 551.242:539.3

Takeuchi, H. (*Seismological Lab., Calif. Inst. of Tech.*), **Torsional oscillations of the earth and some related problems.** *Geophysical Journal*, London, 2(2):89–100, June **1959.** 2 figs., 9 tables, 12 refs., 6 eqs. **DWB, DLC**—Variational calculus methods are applied to the problem of torsional oscillations of elastic spheres of variable densities and elasticities and the corresponding plane Love wave problem for vertically heterogeneous media. The methods work well and give the phase velocity curve (Fig. 1) for the model Earth, the internal constitution of which was inferred by K. E. Bullen. The corresponding displacement distributions are shown. *Subject Headings:* **1. Earth models 2. Love waves 3. Tectonics.** –*Author's summary.*

## E6. GEOCHEMISTRY

12.3–171 552.1

Boyd, F. R. and England, J. L. (*both, Carnegie Inst. of Washington*), **The quartz-coesite transition.** *Journal of Geophysical Research*, Wash., D. C., 65(2):749–756, Feb. **1960.** 3 figs., 4 tables, 13 refs. **DLC**—The quartz-coesite transition curve has been determined over the temperature range 700° to 1700° in the pressure range 20 to 40 kb. The equation for the curve is $P=19.5+0.0112T$, where $P$ is in kilobars and $T$ is in degrees centigrade. The determination was made with an internally heated tungsten carbide pressure vessel utilizing talc for a pressure medium. The results of some runs on the quartz-coesite transition with an anvil apparatus are described. These data are in poor agreement with the determination cited above and the difference is interpreted as an effect of pressure gradients in quartz-coesite runs in the anvil apparatus. Quartz could not invert to coesite in the earth at depths less than about 100 km, and it is therefore unlikely that coesite has formed in crustal rocks. *Subject Headings:* **1. Coesite formation 2. Quartz coesite transition.**—*Authors' abstract.*

12.3–172 551.311.2

Weyl, Peter K. (*Shell Development Co., Houston*), **Pressure solution and the force of crystallization—a phenomenological theory.** *Journal of Geophysical Research*, Wash., D. C., 64(11):2001–2025, Nov. **1959.** 19 figs., table, 10 refs., 53 eqs. **DLC**—The phenomena of pressure solution and the force of crystallization result from removal or deposition of mineral matter in the region of contact between the mineral grains. We assume that this transport takes place by diffusion in a solution film between the grains. The rate of transport depends on the grain size, the effective normal stress between the grains, the diffusion constant in the solution film, the film thickness, and the stress coefficient of solubility. Values of these parameters required to obtain the amount of pressure solution observed in the St. Peter sandstone are reasonable. The theory predicts an increase in pressure solution with decreasing grain size. The effect of clay films between the grains is also to increase the rate of pressure solution owing to the more rapid rate of diffusion in the clay layer relative to a single solution film between clean mineral grains. This explains how pre-existing clay films in the sediment may, because of the greater rate of pressure solution, develop into stylolites. If the interstitial water is supersaturated with respect to the minerals present, precipitation in the area of contact will take place as long as the supersaturation divided by the stress coefficient of solubility is greater than the average effective normal stress between the grains. If the stress is increased above this limit, pressure solution will take place. *Subject Headings:* **1. Pressure solution 2. Stylolites 3. Crystallization force.**—*Author's abstract.*

12.3–173 551.464:546.3/9

†Goldberg, Edward D. (*Scripps Inst. of Oceanog., LaJolla, Calif.*), **Biogeochemistry of trace metals.** *Geological Society of America, Memoir,* No. 67, Vol. 1:345–358, Dec. **1957.** fig., 2 tables, 28 refs., eqs. **DLC** (QH542.N3)—Although more than 90% of marine water exists at depths >1000 m, chemical investigations have been largely concerned with relatively shallow water. A table is presented of the metallic content as a first approximation in relation to its origin of atmospheric and cosmic nature, etc. A trace metal element is considered to be one whose abundance in the sea is <1000 atoms per 1,000,000 atoms chloride. Processes by which these elements are taken up by biological forms, and paleo-ecological aspects are considered. *Subject Headings:* **1. Chemistry of the ocean 2. Trace metals in ocean 3. Biogeochemistry of trace metals.**—*W.N.*

## E7. TSUNAMIS

12.3–174 532.593:550.34

Van Dorn, Wm. G. (*Scripps Inst. of Oceanog., La Jolla, Calif.*), **A portable Tsunami recorder.** *American Geophysical Union, Transactions,* 37(1):27–30, Feb. **1956.** 7 figs., 5 refs., 5 eqs. **DWB, DLC**—A compact self-contained long-period wave recorder has been developed for remote operation on small islands where the influence of continental land masses is minimized. The instrument can be installed in two or three days, requires no electric power, and needs only weekly attention. It can detect waves less than one cm high at its period of maximum response (1000 sec), and it attenuates both swell and tides to about three percent of their relative amplitudes. *Subject Headings:* **1. Long period wave recorders 2. Tsunami recorder.**—*Author's abstract.*

## E8. GEOELECTRICITY

12.3–175 550.375:550.385(798)

Hessler, V. P. and Wescott, E. M. (*both, Univ. of Alaska, College, Alaska*), **Correlation between earth-current and geomagnetic disturbance.** *Nature,* London, 184 (4686), Supp. No. 9:627, Aug. 22, **1959.** fig., table, 2 refs. **DWB**—at College, Alaska, in 1958 the relation between earth current and magnetic activity was measured quantitatively by calculating correlation efficients for each of several months. The correlations were made between the equivalent daily amplitude, Aco, of the College magnetic activity and the mean daily earth current activity. The present paper reports the details of the experiment. On the basis of the very high correlation coefficients obtained it is concluded that earth currents may be used interchangeably with the magnetic disturbances as an indicator of ionospheric activity. *Subject Headings:* **1. Earth current-geomagnetic relationships 2. College, Alaska.**—*I.S.*

12.3–176 550.375:551.510.535(798)

*Hessler, V. P. and Wescott, E. M., **Earth current activity at College, Alaska, 1956–1958** Alaska. Univ. Geophysical Institute, Contract AF 19(604)-3075, Scientific Report No. 2, Feb. **1960.** 17 p. 13 figs., 36 tables, 18 refs. **DWB**—This report presents 3-hourly scalings of earth current activity for the entire period from January 1956 through December 1958. The data are analyzed for diurnal, seasonal, and yearly averages of activity. There is a pronounced diurnal variation in activity with a maximum at local midnight. The principal direction of the earth current disturbances at College is about N 33°W and is so constant that total activity in mv/km can be determined with sufficient accuracy from N-S records. Earth current activity has a high correlation with magnetic activity and other polar ionospheric phenomena. The average of six monthly correlation coefficients between magnetic daily A figures and earth current average daily mv/km is .948. Thus, the earth currents constitute a useful indicator of ionospheric activity. *Subject Headings:* **1. Earth current-ionosphere relationships 2. College, Alaska.**—*Authors' abstract.*

12.3–177 550.375(798)

Hessler, V. P. and Wescott, E. M., **Rapid fluctuations in earth-currents at College.** Alaska. University. Geophysical Institute, Contract AF 19(604)-3075, Scientific Report No. 1, Jan. **1959.** 24 p. 10 figs., 10 refs. **DWB**—An unusual type of earth-current variation is regularly observed in the College records. The phenomena consist of more or less regular fluctuations with range from a few mv/km to more than 1000 mv/km, and periods ranging upwards from 6 sec. The fluctuations may continue from a few minutes to several hours. They have a strong diurnal variation at College with a broad maximum at 0600 local time. The fluctuations also occur at a site about 100 km southeast of College, but are not observed at Barrow. Thus these rapid fluctuations display characteristics quite different from the previously classified magnetic and earth-current continuous pulsations, *pc*'s and train pulsations, *pt*'s. Special equipment was devised to count and record the period of the fluctuations on a continuous basis. Typical rapid fluctuation traces and charts showing their activity patterns are presented. *Subject Headings:* **1. Earth current variations 2. College, Alaska.**—*Authors' abstract.*

12.3–178 551.510.535:538.56

Volland, Hans (*Heinrich-Hertz-Institut der Deutschen Akad. d. Wissenschaften, Berlin-Adlershof*), **Elektromagnetische Induktion in Ebenen mit örtlich variabler Leitfähigkeit, Teil 1.** [Electromagnetic induction in a plane with locally variable conductivity, Pt. 1.] *Beiträge zur Geophysik*, Leipzig, 68(2):110–122, **1959.** 5 figs., 8 refs., 34 eqs. German and English summaries p. 110. **DWB, DLC**—Maxwell's equations are solved with the following conditions: A one-dimensional electric current flows in a plane ionosphere and moves at right angles to its current direction. A plane sheet in the earth's interior has the conductivity $\sigma_i(x)$ $\sigma_0\cdot(q^2/x^2+q^2)$ ($\sigma_0$ is a constant and $q$ a parameter). The magnetic field of the electric current induced in the sheet is determined. Numerical calculations of a special case are made. *Subject Headings:* **1. Electromagnetic field changes 2. Ionospheric electric fields.**—*Author's summary.*

12.3–179 537.362

Belluigi, Arnaldo (*Inst. di Fisica Terrestre dell' Univ. di Perugia*), **Aspetto elettrogeosmotico bidimensionale variabile col tempo.** [Transient bi-dimensional electrogeo-osmotical theories.] *Geofisica Pura e Applicata*, Milan, 43:182–194, May/Aug. **1959.** 3 figs., 4 refs., 40 eqs. Italian and English summaries p. 182. **DWB, DLC**—Till now only monodimensional transient electrogeoosmotical theories have been published. In this paper a solution is given for a problem of bidimensional type, with vertical cylindrical electrodes. The plots which represent the amo units of cathodic water *qk* show quite rapid lowering as far as to reach time durations of the order of "electrodic times $\tau$" ($t=\tau$) volumes which, after, diminish very slowly. In this case more extended *qk* "lobbies" are found than those in a monodimensional case ($t=\tau/9$). Furthermore, increasing the ratios heteropolar spacings-cathodic radii, or diminishing the cathodic radii, water discharges (which result from the contribution of the single anods) increase as plotted in the diagrams. *Subject Headings:* **1. Transient electro-geoosmotical theories 2. Electro-endosmosis.**—*Author's abstract.*

12.3–180 550.372

Fritsch, Volker, **Geoelektrische Tiefsondierungen und ihre Übereinstimmung mit Bohrbefunden.** [Geoelectric deep soundings and their agreement with results of drillings.] *Geofisica Pura e Applicata*, Milan, 44:144–153, Sept./Dec. **1959.** 6 figs., 4 refs., eq. German and English summaries p. 144. **DLC**—Some measurement methods are described for geoelectrical deep-investigations down to a depth of 100 m. Then the obtained results are discussed. The results of the geoelectrical deep-investigations were confirmed in a very satisfactory manner by deep drillings. The average limit of error of the geoelectrical predictions was ±8–13%. *Subject Heading:* **1. Geoelectric soundings.**—*Author's summary.*

12.3–181 550.372(798)

Stanley, Glenn M., **Studies of ground conductivity in the Territory of Alaska.** Alaska. Univ. Geophysical Institute, Contract NObsr 72528, Interim Scientific Report No. 1 (Covering work done Dec. 1, 1955 to Oct. 31, 1958), Oct. 31, **1958.** 36 p. 8 figs., table, 15 refs., 10 eqs.—The effective ground conductivity of Alaska has been determined by a comparison of experimental and theoretical field strengths. The experimental field strengths have been obtained by use of an airborne receiver, flown along radial paths from a large number of CAA radio ranges and beacons. The surface wave attenuation factor was computed for both a plane and a curved, homogeneous earth by methods presented by Norton. The experimentally determined relative field strengths were plotted as a function of distances and were compared with a family of curves for assumed values of conductivity and dielectric constant. From this comparison, that value of conductivity that best fits the experimental data is taken as the effective conductivity over the path. An investigation of the effect at dielectric constant on the transmitted signal shows that, within the frequency range used, a change of dielectric constant from 1 to 20 has but little effect on the attenuation of the transmitted signal for values of conductivity between 1 and 5 mmho/m. The experimental results indicate that for most sections of Alaska, the effective conductivity falls within this range. In some cases the earth was not homogeneous over the entire flight path as evidenced by changes in the slope of the field strength vs distance curves. In such cases, the data were replotted with an initial point at the discontinuity and new theoretical curves were drawn for each section of the field strength vs distance curves. Investigation of the variation of effective conductivity with change of frequency and at different seasons was made. In addition, wave tilt methods of determining the conductivity were used. A 'Ground Constants Measuring Set' was obtained from the Signal Corps and measurements were made in selected areas in Alaska. Attempts were made to use 'height-gain' and 'mutual coupling of loops' techniques but these were not successful. An investigation of anomolous propagation in the vicinity of Point Barrow was made. It was determined that this anomolous propagation appears to be the result of a layered earth. In addition to the anomolous propagation in the vicinity of Point Barrow, there appears to be similar anomolies in the vicinity of Kotzebue, Galena, Bethel and Port Heiden. From the above investigations a map showing the effective conductivity of Alaska as determined by the attenuation method is presented. *Subject Headings:* **1. Ground conductivity 2. Alaska. I. Contract NObsr 72528 II. Alaska. Univ. Geophysical Inst.**—*Author's abstract.*

12.3–182 550.373:551.43(798)

*†Wescott, E. M. and Hessler, V. P., **The effect of topography and geology on telluric currents.** Alaska. Univ. Geophysical Inst., Contract AF 19(604)-3075, Scientific Report No. 3, April 1960. 30 p. 33 figs., 17 tables, 25 refs., eqs. **DWB**—The electric field vectors E, associated with telluric currents are known to vary in comparative magnitude and principal direction at different locations. Large differences in the vectors from several Alaskan stations prompted a study to determine what effect topography and geology have on the telluric field, and in particular what variations are found in the vicinity of the Institute recording site. Seventeen field sites were established and recordings made for comparison of simultaneous disturbances with the Institute records. The results of this study show that the comparative magnitude may change by a factor of five and the principal direction may range over 33 degrees, and in one extreme case 70 degrees in the area. Model studies using a resistor network were made to determine the effects of some simple topographic and conductivity configurations upon the telluric field. Surface resistivity measurements were made at each recording location, for interpretation of the field data. Some of the interesting field results are explained on the basis of the model studies and the resistivity measurements. The principal direction at the Institute site agrees within ten degrees of the regional principal direction, but the magnitude is abnormally high compared to the regional values. *Subject Headings:* **1. Telluric currents 2. Topographic effects on telluric field 3. Alaska.**—*Authors' abstract.*

12.3–183 550.37:551.16

†Tozer, D. C., **The electrical properties of the earth's interior.** *Physics and Chemistry of the Earth,* Vol. 3, pub. N. Y., Pergamon Press, **1959.** p. 414–436. 5 figs., 4 tables, 34 refs., eqs. **DWB** (551 P578), **DLC** (QC501.P53) –The article attempts to describe the present knowledge of the electrical properties of the mantle and core of the earth. The larger part of the study covers in four sections the electrical properties of the mantle: I. Methods of observation, II. Conductivity of minerals, III. Combination of experimental data with its theoretical interpretation, IV. The effect of the electrical conductivity on the thermal properties of the mantle. Sec. V is a brief discussion of the electrical properties of the core. It is shown that the mantle below a few hundred kilometers may be treated as an electronic semiconductor. In the description of the various methods of estimating the conductivity of the core, attention is drawn to the considerable uncertainty due to the materials dissolved in the iron. *Subject Headings:* **1. Earth's physics 2. Earth's chemistry 3. Electrical properties of earth's interior.** —*E.K.*

12.3–184 550.375

Barsukov, O. M., **Variatsii preimushchestvennogo napravleniia i sredeneĭ amplitudy korotkoperiodicheskikh kolebaniĭ telluricheskikh tokov.** [Variations in the preferred direction and mean amplitude of short period oscillations of telluric currents.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.,* No. 8:1040–1043, **1958.** 5 figs., 2 refs. **DLC.** Transl. into English in the corresponding number of the *Akademiia Nauk, Bulletin of the Academy of Sciences, USSR, Geophysics Series.* **DLC**—The distribution of short period oscillations of telluric currents in time and space was investigated by dividing the tellurogram into 3.32 min. intervals. The amplitude of the record, $R_n^E$ for the easterly and $R_n^N$ for the northerly components of field intensity in mv/km, were measured. After averaging for each hour

$$\frac{1}{m}\sum_{n=i}^{m} R_n^E = R^E, \quad \frac{1}{m}\sum_{n=1}^{m} R_n^N = R^N$$

($m$ = number of intervals per hour), the magnitudes $R^E$ and $R^N$ are averaged for whole day (individually for each hour.) The value $A = \sqrt{(R^E)^2 + (R^N)^2}$ characterizes the amplitude and the ratio $R^E/R^N = ctg\varphi$, azimuth of oscillation with a period close to the selected interval. The dependence of these magnitudes upon time are termed correspondingly variations of mean amplitude and variations of the prevailing direction of the short period oscillation. Results are presented showing that the variations of the prevailing direction and of the mean amplitude of short period oscillations possess a distinct daily variation for each station which is repeated regularly, at least in the course of three months; that the variations of prevailing direction at different stations are not similar, either with respect to world or local time; and that the observed relationship of variation of mean amplitude and zonal (local) time requires a large amount of statistical data for a large number of stations. *Subject Headings:* **1. Telluric currents 2. Short period oscillations of telluric currents.**—*I.L.D.*

# F. OCEANOGRAPHY AND HYDROLOGY

## F1. OCEANOGRAPHY

*See also:* **Marine climate, S. Pacific,** 12.3–16; **Shokal'skiĭ—Russian oceanographer** (Orlov), 12.3–39; **Wind driven sea spray** (Sanpei), 12.3–94; **Pressure-wind relationships at sea** (Bijvoet), 12.3–276; **Sea temp. determination** (Khanaĭchenko, Fuks), 12.3–322; **Sea water temp. and salinity** (Poornachandra), 12.3–323; **Calif. current** (Reid et al.), 12.3–324; **Deep water research, Norwegian Sea** (Mosby), 12.3–326; **Deep Pacific circulation** (Wooster, Volkmann), 12.3–327; **Ocean temp. and oxygen distribution** (Wooster, Cromwell), 12.3–328; **Ocean-atmos. interaction** (Hanzawa), 12.3–330; **Wind effects on water surfaces** (Hühnchen), 12.3–352; **Wind effects on waves** (Ozaki), 12.3–353; **Storm surge forecasting** (Rossiter), 12.3–354; **Wind effects on ocean swell** (Venkiteshwaran), 12.3–355; **Geostrophic winds, N. Pacific** (Eber, Sette), 12.3–356.

12.3–185 551.546

†Cowen, Robert C., **Frontiers of the sea: the story of oceanographic exploration.** Introd. by Roger R. Revelle. Drawings by Mary S. Cowen, Garden City, N. Y., Doubleday, **1960.** 307 p. 54 figs., photos, bibliog. p. 297–299. Price: $4.95. **DLC** (GC11.C65)—The emergence of oceanography is the theme of this book. Its scope is necessarily broad, encompassing many disciplines. A general overview is well balanced with the inclusion of pertinent details. Busy scientists and science students, among others, will appreciate this comprehensive and timely digest of information in a major and rapidly growing research field. Chapter headings are: I. Exploring the hinterland—birth of a science—the great voyage—growth and challenge. II. Beginnings—the atomic clock—birth of a planet—origin of the seas and their basins—rise of life—a bit of crystal gazing. III. The unseen landscape—the threshold—descent to the abyss—canyons in the deep—forces of mud and silt—mountains beneath the sea—the dustfall. IV. Probing the deep—sea floor—the record of the sediments—the oxygen thermometer—beneath the sediments—the Pacific's ring of fire—sunken islands—living reefs—the coral reef controversy—filling the deep ocean basins. V. Patterns of the waters—theory vs reality—the pattern of the breakers—shifting sands—the force of waves and spray—"Tidal waves"—the pulse of the earth. VI. The restless waters—patterns of the currents—desert in the sea—the Gulf Stream: A study in complexity—El Nino—a second "Gulf Stream"—the power of salt and heat—"Wrong Way" current. VII. The great heat engine—the thermodynamic flywheel—the big experiment—frozen paradox—Atlantic thermostat—the advancing sea—"Adjusting" the heat engine. VIII. Waters of life, the wanderers—the grass of the sea—march of the seasons—scavengers of the sea—the grazers—"Larval forms"—the "commuters." IX. The range of ocean life—the rigors of the shore—the great life zone—the "living soup"—the weirdest fish in the sea—cold light—the deepest life. X. The promise of plenty—improving the fisheries—the problem of preservation—the vision of plankton fishing—farming the seas—ocean treasure house—mining the ocean floor. XI. The new oceanography—the underwater "Balloon"—beyond the Bathyscope—the Mohole—atomic wastes into the sea—the need for ships. Many well selected photographs and excellent sketches are included. *Subject Heading:* **1. Oceanographic research.**—*E.Z.S.*

12.3–186 551.511:551.526.6:551.513:551.509.33

Neumann, G.; Fisher, E.; Pandolfo, J. and Pierson, W. J., Jr., **Studies on the interaction between ocean and atmosphere with application to long range weather forecasting.** New York. Univ. College of Engineering. Research Div. Dept. of Meteorology and Oceanography, Contract AF 19(604)-1284, Final Report, April **1958.** 100 p. figs., tables, 13 refs., 13 eqs. **DWB** (M26.6 NS32st)—This report contains three separate papers: **1. Sea surface temperature anomalies and their relation to the general atmospheric circulation, 2. The eddy flux of energy from the sea to the atmosphere related to the planetary circulation and 3. On the use of time series concepts and spectral and cross spectral analyses in the study of long range forecasting problems.** The first paper is devoted to a study of origin and behavior of monthly mean surface temperature anomalies for the eastern North Atlantic Ocean where the phenomena seem to possess persistency and occur regionally. The warming up period 1876–1900, the intermittent cooling 1900–1925, and the warming up period 1925–1950, are analyzed in terms of seasonal and geographical distribution. The next paper is on the day-by-day examination during winter of the heat flux from the sea off the east coast of the U. S. which shows up one day or two days later in the planetary circulation at 500 mb about 35°–40° downstream. In this pioneering discussion of the problems a derivation of Sutcliffe's "development equation" is introduced. The third paper is on how a 50% predictability of sea surface temperatures is arrived at based on the past values. References to the literature is given at the end of each of these papers. *Subject Headings:* **1. Sea surface temperature anomalies 2. Eddy flux 3. Long range forecasting of Ocean-atmosphere interaction.**—*W.N.*

12.3–187 551.551:551.556.8:532.593:551.465

Phillips, Owen M. (*Johns Hopkins Univ.*), **Wave generation by turbulent wind over a finite fetch.** *U. S. National Congress of Applied Mechanics, 3d, Brown Univ., Providence, June 1958, Proceedings*, pub. **1958.** p. 785–789. fig., 4 refs., numerous eqs. **DLC** (TA5.U52) Review by F. Ursell in *Mathematical Reviews*, Providence, R. I., 20(10):1124–1125, Nov. **1959.** —When a turbulent wind blows across the surface of an inviscid liquid (water), waves are generated by the interaction of the convected pressure fluctuations and the free surface. The rate of growth of each Fourier component of the wave field is the greatest when the convection velocity of the component of the pressure fluctuations is equal to the velocity of free surface waves of the same wave-number. In this paper, the growth of waves over a finite is studied, and an expression is derived for the mean square surface displacement $\overline{\xi}^2$ as a function of position in the wave field. For a semi-infinite sheet of water $\overline{\xi}^2$ is proportional to the fetch, a relation in good agreement with experimental observations. *Subject Headings:* **1. Wave formation Turbulence effects on water 3. Wind effects on water surfaces.**—*Author's abstract.*

12.3–188 551.556.8:551.465:532.593(262.5)

Spătaru, A., **Regimul valurilor in apropiere de litoralul rominesc.** [The wave regime near the Romanian shore.] *Meteorologia, Hidrologia și Gospodărirea Apelor*, Bucharest, 4(1):24–32, **1959.** 13 figs., 8 refs. Russian, French, and English summaries p. 77–80. **DWB** -The paper proposes a method which makes it possible to obtain certain data on the regime of deep water waves in the neighborhood of the Romanian shore, using the existing data on winds. The author shows the possibility of using the wind values recorded at the meteorological station at Constanta. Then, making use of the daily records and the indications given by L. F. Titov on wave generation by wind, the author calculated for a certain year the succession of deep water waves near the Romanian shore. Based on the results, an annual and seasonal energy diagram (rose) of the waves is constructed. From these data correlated with the mean characteristics (considered as energetic) of the wind regime on directions and seasons, there are obtained the mean energetic roses of the waves for the period 1931–1950. *Subject Headings:* **1. Wind effects on water surfaces 2. Wave generation 3. Water waves 4. Black Sea.**—*Author's abstract.*

12.3–189 551.511:551.513:551.526.6

†Mintz, Yale (*Hebrew Univ. Jerusalem*), **Design of some numerical general circulation experiments.** *Research Council of Israel, Bulletin, Section G Geo-Sciences*, 7(2/3):67–114, Oct. **1958.** 22 figs., table, 38 refs., 101 eqs. **DWB** (M13.1 M667de)—The equations of motion are developed for a two-parameter model of the atmosphere with the friction and heating terms retained. An empirical surface stress coefficient is found by the diagnostic use of the equations. A heating function is specified in which the diabatic heating of the air depends on the earth-air temperature difference. It is shown that this heating function can be used in the equations to study the mean zonal and mean meridional circulations of the atmosphere on a land-covered planet and on an ocean-covered planet in which the initial ocean temperature is a function of latitude; and to study the complete general circulation of the atmosphere on an ocean-covered planet in which the initial ocean temperature is a function of latitude and longitude and on a planet covered partly on ocean and partly by land. *Subject Headings:* **1. Equations of motion 2. General circulation models 3. Diabatic heating 4. Ocean temperatures.**—*Author's abstract.*

12.3–190 551.526.6:593.6 551.583.7:551.1

†Ma, Ting-Ying H., **Research on the past climate and continental drift, Vol. 14, The relation of growth rate of reef corals to surface temperature of sea water as basis for study of causes of**

**diastrophisms instigating evolution of life.** Pub. by the author, Taipei, Taiwan, China, June **1958.** 60 p. 17 figs., 24 plates, 29 refs. "Paper to be presented at the 15th International Congress of Zoology, London, 1958." **DWB** (M(055) R432re), **DLC** (QC884.M25)—A most thorough study of reef corals, their structure, seasonal growth, measurements, relation of growth rate to sea water temperature, belts, displacement of paleo reefs from equator; inferences regarding temperature distribution of earth and relation of growth rate to geophysical phenomena. It is concluded that the rate of growth is greater in low than in higher latitudes and that temperatures in tropical seas have not changed much since coral reefs existed, though there is evidence that some disturbance occurred because of continental drift. Charts show locations of continents and seas since the Ordovician Era. *Subject Headings:* **1. Sea temperature effect on coral growth 2. Paleoclimates of tropical seas 3. Continential drift 4. Climatic changes.** —*M.R.*

12.3–191 551.526.6:546.13:582.261

Uyeno, Fukuzo, **Relation between diatom quantity, temperature and chlorinity in the neighbouring sea near the south coast of Honshu, Japan.** *Kobe, Japan. Marine Observatory, Memoirs,* 12(1):1–6, Feb. **1958.** 3 figs., 9 refs. **DWB**—Diatom quantity in the surface of the sea near the south coast of Honshu is generally related to the variations of temperature and chlorinity. We may deduce that a combined characteristic of temperature and chlorinity essentially represents the limiting factors, if confined to the surface. More detailed investigations on each separate species in the neritic zone are needed. During the summer the horizontal gradient of temperature and chlorinity is steep; but in winter, gradual. The conclusion the author finally reaches is that the diatom quantity near the south coast of Honshu is a maximum quantity limited by certain limiting factors somehow modified by convergence and upwelling. *Subject Headings:* **1. Temperature-chlorinity-diatom quantity relationships 2. Honshu Coast, Japan.**—*N.N.*

12.3–192 551.526.6:551.465

†Chalysheva, N. I., **Pereraspredelenie tepla techeniiami v Iaponskom more.** [Redistribution of heat by currents in the Japan Sea.] *Moscow. Gosudarstvennyĭ Okeanograficheskiĭ Institut, Trudy,* No. 35:102-118, **1957.** 6 figs., 3 tables, 13 refs., 4 eqs. **DWB**--The transport of heat by currents through Tsushima Strait to the Sea of Japan is investigated by the method of direct computation of advection from observations on water temperature and current velocity. The data employed for computation consisted of hydrological observations on standard cross sections in the Sea of Japan. The annual variability of the currents in the Sea of Japan was investigated by a harmonic analysis of the temperature curve and the ratio of the semiannual to annual variation of surface temperature was computed; the greatest amplitude was along the Primor'e coast (0.20–0.25), the lowest in the southern part of the sea near Korea (0.05–0.10). The computation of heat advection through Tsushima Strait was based on observations made in June 1932 and July 1933 in the Sea of Japan. The boundaries of the currents of warm water were determined according to the velocity of the layers computed by dynamic methods. The computation was in degrees, advection being determined by $V(\partial\tau/\partial x)$ and the results are presented in degrees$\varphi$/month. The results of computations indicate that the direct method gives only an approximate conception of the variations of water temperatures produced by the redistribution of warm currents. They also show that in the flow from Tsuruga to Vladivostok (northward flow of water) the advective temperature change is slight. The calculation of water temperature deviations from year to year as a result of advection by a transformation of McEwen's formula for computing the temperature changes of water upward or downwards from the mean in a current on the basis of mean long period data is described. The year to year change in water temperature produced by advection may be considerable. The relative redistribution of advective heat in the Central and southern parts of the Sea of Japan determined on the basis of long period water surface temperatures both for individual months and entire years, is shown on charts. *Subject Headings:* **1. Heat transport by currents 2. Water temperature variations 3. Sea of vapor.**—*I.L.D.*

## F2. SEA ICE

*See also:* **Ice research, Arctic,** 12.3–29; **Forest influences on river ice breakup** (Baĭdin), 12.3–442.

12.3–193 551.321.4:551.324.412 551.321.7

Peshchanskiĭ, I. S., (*Arctic Res. Inst., Moscow*), **Physical and mechanical properties of Artic ice and methods of research.** *National Research Council, Wash., D. C., Publication,* No. 598:100–105, Dec. **1958.** 7 refs. **DLC, DWB** (551.311 A675pr) —A paper reporting the research work carried out in the field of Arctic ice by the Arctic Research Institute of the Soviet Union. The approach adopted by the Institute is to study ice as a physical body while treating ice cover as a geographical factor. Formerly these two concepts were not disconnected. In accordance with this division the paper first enumerates different kinds of Arctic ice and discusses their properties. Then in the light of various researches undertaken by the Institute the types and features of an ice cover are considered. Finally, the elasticity, stress and temperature distribution of ice fields are discussed. A discussion was held on this paper in which 5 scientists participated. *Subject Headings:* **1. Ice properties 2. Ice cover 3. Ice fields 4. Arctic.**—*I.S.*

12.3–194 551.321.5(98)

Laktionov, A. F. (*Arctic Res. Inst., Moscow*), **Ice observation methods.** *National Research Council, Wash., D. C., Publication* No. 598:48–56, Dec. **1958.** 8 figs., 40 refs. **DLC, DWB** (551.311 A675pr)—The paper discusses the methods employed for ice observations in Arctic seas. The development of these methods is traced from early times (16th and 17th centuries) to the present. The use of aircraft, first made in Russia in 1914, widened the scope of ice observations in the Arctic area. Ice surveys from aircraft make it possible to determine the kind and configuration of ice, its closeness, lummocking, decay, compression, snow cover, contamination, freezing, drift, and thickness. The paper describes the operation of survey flights in the Arctic. Maps show ice observation routes and a model layout for navigation ice reconnaissance. Later, instrumental ice observational methods are mentioned and graphically illustrated. Finally, use of aerial photographs in ice observations is discussed and four photographic reproductions of ice samples are printed. *Subject Headings:* **1. Ice observation techniques 2. Arctic surveys 3. Arctic seas.**—*I.S.*

12.3–195 551.322:539

*†Nakaya, Ukichiro, **Mechanical properties of single crystals of ice, Pt. 1, Geometry of deformation.** *U. S. Snow Ice and Permafrost Research Establishment, Research Report,* 28, Oct. **1958.** 46 p. 58 figs., 5 tables, 19 refs., 42 plates, 14 eqs. **DWB, DLC**—Bending tests were performed on nearly 300 rectangular bars of glacier ice cut from large single crystals (up to 16 in.) at varying orientations. Vertical displacement of a median loaded wedge was measured by a screw micrometer. The deformation was complex, sometimes varying with slight changes in crystallographic orientation. The phenomena observed can be explained by assuming that: single crystals of ice have a layer structure stacked in the direction of the optic axis; plasticity is due to gliding between these elementary layers; a small-angle boundary is likely to occur at the point of intense stress concentration (upon which the sample deforms like an assembly of blocks); and the elementary layer is flexible but not stretchable. *Subject Heading:* **1. Ice crystal—plasticity.**—*Author's abstract.*

12.3–196 551.326.8:536.421:546.212

Goriunov, I. V., **Bor'ba s donnym l'dom i shugoĭ putem uskoreniia obrazovaniia ledianogo pokrova.** [Combating bottom ice and sludge by accelerating the formation of ice cover.] *Meteorlolgiia i Gidrologiia,* Leningrad, No. 11:31, Nov. **1958. DWB, DLC**—Experiments on the freezing of polynia showed that a water surface covered by dry branches is quickly covered with ice. In further experiments on the Oka River at the Kuz'minsk Hydroelectric Station, wires were coiled in pairs and branches were fastened between them so that long plaits with densely intertwined branches resulted. The covering of open water sections with these plaits was completed Dec. 14 when $\Sigma t = -63.32°C$. The sections became covered with ice at 12 h

Dec. 15 when $\Sigma t = -75.59$°C. The part of the polynia serving as a control froze at $\Sigma t = -269.58$°C. *Subject Headings:* **1. Ice cover formation 2. Oka River, U.S.S.R.** —*I.L.D.*

12.3–197 551.326.7

Dykins, J. E. (*U. S. Naval Civil Engin. Lab., Port Hueneme, Calif.*), **Development of sea ice construction techniques.** *U. S. Air Force. Cambridge Research Center, GRD Research Notes*, No. 29, Dec. **1959**. p. 122–128. 4 figs., **DWB**—In summing up, since it does not appear likely that a technique can be developed which will duplicate the natural process of ice growth, the technique developed for producing this artificially-formed ice will have to cope with the problems bypassed in the natural process. Present data indicate that to accomplish a major thickening of an ice sheet, the technique of surface flooding has the best process for success. The successful development of this technique will have to be achieved through a series of experimental adjustments until the ice produced has the best combination of physical properties and construction characteristics. It is within this overlapping area of engineering and science where most of this development will take place. This year's trials indicate that (1) thinner flood layers, approximately 3 in. deep, produce a slightly better quality ice with fewer construction problems than the deeper flood increments, and (2) the technique of free flooding appears feasible and potentially offers many advantages over present surface flooding techniques. It is within this scope of thought that immediate future trials are being planned. *Subject Headings:* **1. Sea ice cover construction 2. Artificial ice cover.**—*Author's abstract.*

12.3–198 551.5:551.326.7(261.3)

†Betin, V. V., **Ledovye usloviia v raione Baltiiskogo moria i na podkhodakh k nemu i ikh mnogoletnie izmeneniia.** [Ice conditions in the area of the Baltic Sea and in approaches to it and their long period variations.] *Moscow. Gosudarstvennyĭ Okeanograficheskiĭ Institut, Trudy*, No. 41:54–125, **1957**. 38 figs., 3 tables, foot-refs., 66 refs. **DLC**—Special attention is given to the studies of ice conditions and their characteristics during winters of different severity. These studies were conducted by the State Oceanographic Institute during long periods and many hydrometeorological factors and their significance are reviewed together with materials obtained by the investigators abroad. The review opens with the observations made from 16th century up to 1948, with characteristics and terminology of ice conditions related to navigation. Collected materials on ice condition are analyzed in respect to the severity of winter temperatures, distribution of concentrated ice and with illustrations of typical cases of anticyclone movement, average monthly position of the center of atmospheric action, pressure at sea level, air temperature of normal and severe winters, etc. Specific ice conditions are described with illustrations for the Baltic Sea, Gulf of Riga, Danish Straight, and area near the North Sea, covered by ice, are graphically indicated with relation to water temperature and geographic position. Problems of ice thickness growth are analyzed with the graphic relation of thickness and degree-temperature, days of frost. Yearly repetition and fluctuation from general average conditions are described with details. *Subject Headings:* **1. Ice conditions 2. Baltic Sea 3. Gulf of Riga 4. Danish Straight 5. North Sea.**—*N.P.S.*

12.3–199 551.326.62:551.583.3

Crary, A. P.; Kulp, J. Laurence and Marshall, E. W., **Evidences of climatic change from ice island studies.** *Science*, Wash., D. C., 122(3181):1171–1173, Dec. 16, **1955**. 2 figs., table, 8 refs. **DLC**—T3 is about 11×5 mi, 170 ft thick, mainly ice with dirt layers. The upper part is iced firn, the lower is partly sea ice. It was probably formed on the northern coast of Ellesmere Is., breaking away after the summer of 1935. The dirt layers accumulated during many-year warm cycles; the top layer is still forming. Radio carbon dating gives ages of 5730 and 3050 years for the dirt layers (probably representing the climatic optimum) and 450±200 years. It is considered that the ice is now thinner than ever before in historical times and that we are approaching a period of open polar sea. *Subject Headings:* **1. Post-glacial climates 2. Ice islands 3. Arctic Ice Island (T-3) 4. Arctic.**—*C.E.P.B.*

12.3–200 551.326.7:656.61

U. S. Hydrographic Office, **Handling a vessel in ice.** *The Institute of Navigation, London, Journal*, 12(2):141–152, April **1959**. 12 figs. (photos). **DWB,DLC**—"Originally printed on back of the April 1958 Pilot Chart of the North Atlantic Ocean."—Various techniques of navigating a ship in ice are discussed. A variety of possible ice situations are considered and systems of ice navigation suitable to different climatic conditions are suggested. Instructions are given for breaking ice and for safe navigation. Warnings for possible and anticipated dangers along with information concerning all practical stages of handling a ship in ice are offered. The article includes twelve photographic representations of different types of ice. *Subject Headings:* **1. Navigation in ice 2. Ice photographs.**—*I.S.*

12.3–201 551.321.6:551.324.3:551.326.7

Zubov, N. N., **O predel'noiĭ tolschchine morskikh i materikovykh l'dov.** [The limiting thickness of sea and land ice.] *Meteorologiia i Gidrologiia*, Leningrad, No. 2:22–27, Feb. **1959.** fig., 2 refs. **DWB, DLC**—The formation of continental and marine ice, the latter either as a result of growth or piling up of ice blocks is summarized. The dependence of growth in ice thickness upon negative air temperatures is given by Stefan's equation $(k\theta/i)dT=\lambda\delta di$, where $i$=thickness of ice; $k$=coefficient of heat conductivity; $\theta$=temperature difference between upper and lower surface; $T$=time; $\lambda$=heat of crystallization, and $\delta$=density of ice. By integration the equation $i^2=(2k/\lambda\delta)R$ is obtained where $R$=sum degree days of frost or sum of negative air temperatures from the time of formation of a continuous ice cover. For the Soviet Arctic the empirical formula $i^2+50i=8R$ is used; $\Delta i=-(25+i_0)+\sqrt{(25+i_0)+8\Delta R)}$ where $i_0$=initial ice thickness, $\Delta i$=increment in ice thickness and $\Delta R$=increment in number of degree days of frost. The application and validity of this empirical formula to marine ice in the Arctic, Greenland and Antarctica is illustrated. An examination of the limiting thickness of continental ice and the heat regime of an ice cover is considered to involve a flow of cold downward from above and a flow of heat upward; the former is given by the amount of heat given off to the atmosphere by unit of ice surface of time is $(k\theta/E)$ where $k$=coefficient of heat conductivity of ice; $E$=thickness of ice under the active layer and $\theta$=temperature difference between the lower surface of the active layer and the lower surface of the ice cover which is considered equal to freezine temperature; the latter is given by $q=(k\theta/E)$ or $E=(k\theta/q)$ where $q$=internal heat of the earth. The limiting thickness of the ice lying upon the bottom ($I$) when the temperature at the surface of separation between ice and bottom is equal to 0°C as given by $I=D+E$, where $D$=thickness of the active ice layer. With the aid of a diagram the author presents a simple geometric method for determining the limiting thickness of an ice cover without using the coefficient of heat conductivity and the internal heat of the earth. *Subject Headings:* **1. Sea ice thickness 2. Land ice thickness 3. Ice thickness limitations.** —*I.L.D.*

12.3–202 551.326.7:778.3

Dunbar, Moira (*Defence Res. Board, Ottawa*), **Curious open water feature in the ice at the head of Cambridge Fiord.** *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Toronto, Sept. 1957,* [*Transactions*], Vol. 4, pub. **1958.** p. 514–519. 4 photos, 3 refs. **DWB, DLC**—In April 1951 the RCAF photographed a pool in the fast ice of Cambridge Fiord which formed such a perfect circle, and had such clean edges, that it was at first mistaken for a spot on the negative. The area was photographed at intervals for the next two years, and each year the pool reappeared in an otherwise continuous cover of fast ice. It varied from about 160 to 300 ft in diameter and appeared, in one year at least, quite late in the season, a photograph in February showing no sign of it. An attempt will be made to analyze the evidence in the photographs, to correlate it with the available meteorological and hydrological data, and to suggest possible causes for the phenomenon. *Subject Headings:* **1. Ice pools 2. Cambridge Bay, Northwest Territories.**—*Author's abstract.*

12.3–203 **551.578.46** 551.326.7

Anderson, Don L., **The physical properties of snow and sea ice.** *U. S. Air Force. Cambridge Research Center, GRD Research Notes,* No. 29, Dec. **1959.** p. 136–140. 6 figs., 6 refs. **DWB**—Most of the physical properties of sea ice are complicated functions of temperature and salinity because of the continuous change of phase taking place as it freezes. A model consisting of intergrowing spheres of ice has been used to calculate such properties of snow as dielectric constant, elasticity, strength, and thermal conductivity. Physical properties change at the "critical density"—snow/firn or firn/ice boundary. Theoretically and experimentally, strength and elasticity are almost the same function of density. *Subject Headings:* **1. Sea ice properties 2. Ice models 3. Snow properties 4. Critical density of snow and ice.**—*E.Z.S.*

## F3. HYDROLOGY

*See also:* **Hydrologic engineering** (Biggs et al.), 12.3–1; **Monsoon effects on floods** (Naqvi), 12.3–346.

12.3–204 551.526.8:532.54:536.41:627.81

Welander, Pierre (*Int. Met. Inst., Stockholm*), **Note on the self-sustained oscillations of a simple thermal system,** *Tellus, Stockholm,* 9(3):419–420, Aug. **1957.** 2 figs., ref. **DWB, DLC**—When the ends of a narrow U-shaped tube filled with water are connected with two open water reservoirs and the tube is heated from below and cooled from above, the free surface of the water reservoirs rose and fell periodically indicating an oscillatory flow through the tube. The oscillation could be varied by changing the cross section area of the tube. This self sustained, nonlinear oscillation is explained as follows: It is assumed that water is initially at rest and that as a result of an outside disturbance a small amount of water is displaced to the right shank of the U-tube. Gradually a difference in level is built up between the reservoir and the flow is slowed down. Finally, the flow stops when the buoyancy flow and the pressure gradient, due to the difference in level, balance. "When the motion stops the heating and cooling tend to create a symmetric temperature distribution, thereby reducing the buoyance force and the flow starts in the opposite direction." When the difference in level is zero there still exists a buoyancy force which sustains the flow, and the motion proceeds periodically. A mathematical analysis of the oscillation is presented. *Subject Headings:* **1. Thermal expansion of water 2. Fluid motion.**—*I.L.D*

12.3–205 532.5:551.482

Yih, Chia-shun and Guha, C. R. (*both, Iowa Inst. of Hydraulic Res.*), **Hydraulic jump in a fluid system of two layers.** *Tellus,* Stockholm, 7(3):358–366, Aug. **1955.** 6 figs. (incl. photo.), 12 refs., 19 eqs. **DLC**—The number of conjugate states for the flow of a fluid system of two layers is investigated by means of the momentum principle. The uniqueness of the conjugate state is proved for the cases in which the modified Froude number of either layer is predominantly large. Specific experimental results for three special cases demonstrate the uniqueness of the state downstream from the hydraulic jump, and show that, for a first approximation, the simple analysis provides a means for determining the downstream depths, with smaller errors for lower jumps. *Subject Headings:* **1. Hydraulic jump 2. River flow.**—*Authors' abstract.*

12.3–206 532.13

Benton, George S., **Occurrence of critical flow and hydraulic jumps in a multilayered system.** Johns Hopkins Univ. Dept. of Civil Engineering, Contract Cwb 8133, Technical Report, No. 1, Feb. **1953.** 32 p. 3 figs., 9 refs., 57 eqs. **DWB**—Using the speed of long waves of infinitesimal amplitude as the criterion for critical flow, general expressions are obtained for critical conditions in a fluid system of $n$ layers, where velocity as well as density vary from layer to layer. It is shown that at critical flow, energy per unit volume in each layer, total energy transfer, and total momentum transfer are all minima. The multi-layered system is in this respect a simple extension of the one fluid regime, since the fluid system cannot pass through critical flow in steady state over a horizontal surface without occurrence of a finite surface or internal hydraulic jump. These principles are illustrated by a detailed analysis of a two layer system, and it is shown that momentum and energy considerations are insufficient to specify conditions below a standing hydraulic jump when all upstream parameters are known. The implications of this concept are discussed in connection with the changes a real two fluid system will undergo when momentum and energy are abstracted by friction. *Subject Headings:* **1. Fluid mechanics 2. Hydraulic jump.**—*Author's abstract.*

12.3–207 525.66:551.463

†Postma, H. and Kalle, K., **Die Entstehung von Trübungszonen im Unterlauf der Flüsse, speziell im Hinblick auf die Verhältnisse in der Unterelbe.** [The development of turbid zones in the lower course of rivers, especially in the lower Elbe.] *Deutsche Hydrographische Zeitschrift*, Hamburg, 8(4):137–144, **1955.** 3 figs., table, 34 refs. German, English and French summaries p. 137. **DWB**—Turbid zones develop in tidal rivers where river and sea water mix. They are attributed to trapping of suspended matter. Values of extinction coefficients, chlorinity and fluorescence in the lower Elbe are given. *Subject Headings:* **1. Turbidity of rivers 2. Elbe River.**—*C.E.P.B.*

12.3–208 551.48.018 551.482

Fesenko, N. G., **Prisposoblenie dlia otbora prob vody po poperechnomu stvoru reki.** [Apparatus for sampling water along a cross section of a river.] *Meteorologiia i Gidrologiia*, No. 2:44, **1958.** fig. **DWB, DLC**—With the aid of a diagram, the author describes a method for taking water samples in a river along a given vertical cross section under any weather condition and at any time. To a cable or truss stretched across the measuring point, a plastic hose is attached by means of metal rings; the end of the hose fastened to an extension from the truss provided with a weight. The motion of the truss causes a movement of the weight and of the hose. Markings upon the truss enable the end of the hose to be moved exactly along a given vertical. Samples are selected either by means of a pump or by using the siphon principle. The application of the latter is described. *Subject Headings:* **1. River hydrology 2. Hydrologic instruments 3. Water samplers.**—*I.L.D.*

12.3–209 551.497

Meissner, R., **Zum Problem der intermittierenden Quellen.** [Problem of intermittent springs.] *Frankfurt a.M. Universität. Meteorologisch-Geophysikalisches Institut, Berichte*, No. 6:47–49, **1956.** 2 figs., 2 refs. **DWB?**—The author offers a new explanation for the phenomenon of intermittent springs which are a common phenomenon in karst regions. On the basis of laboratory experiments, the author found that this phenomenon is the result of any damming up or slowing down of an initially rapidly flowing column of water in the discharge arm of a branching system by constrictions, local eddies or restricted upward flow. The resulting change in hydrodynamic pressure explains the intermittent flow. A diagram illustrating the explanation offered by the author is shown. *Subject Heading:* **1. Springs.** —*I.L.D.*

12.3–210 551.579.5:061.3 551.579.5:551.588.6

*†International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Toronto, Sept. 3–14, 1957, **[Transactions], Vol. 2, Groundwater, Symposium Vegetation** (and) **Symposium Dew.** Its *Publication* No. 44, **1958.** 525 p. figs., tables, charts (colored, folded), bibliogs. (For listing of pertinent articles, *see* 10(3):470, March 1959, *Met. Abstracts.*) These articles abstracted separately. **DWB** (M(06) 1611g)—Articles included in this symposium include the following: secondary sources of humidity and ground water supply in Mediterranean France, condensation of water vapor in the soil, diffusion of water in vapor and liquid state in the vicinity of the surface soil, consumption of water by certain agricultural plants in the field, influence of vegetation of highly productive peat lands on water balance, influence of increasing agricultural production on water utilization by cultivated crops, conditions of the formation of underground water in deserts, plants as dew collectors, the evaluation of dew amount, and many other related subjects. *Subject Headings:* **1. Ground water symposium 2. Vegetation influences on ground water 3. Dew.**—*N.N.*

## F4. GLACIOLOGY

*See also:* **Obs. on glaciers** (Charnley), 12.3–22; **Ice research, Arctic,** 12.6–29; **Glacier thickness, Baltoro Glacier** (Marussi), 12.3–136.

12.3–211 551.32(05)

**Ice: News Bulletin of the British Glaciological Society,** No. 1, Jan. **1958**–No. 5, 1960. Issued Cambridge, England, pub. Jan. and July. No. 1 has 17 p. Editor, Mrs. H. Richardson.

Publication free to members of the Society.—Under the proficient editorship of MRS. H. RICHARDSON the new publication **Ice,** replaces the **Report to Members.** It relieves the Society's **Journal of Glaciology** of items of more ephemeral nature. Designed to convey clear-cut information, well organized and in pleasing typography. Consists mostly of contributions from members who are invited to send their typewritten material to: Scott Polar Institute, Lensfield Road, Cambridge, Eng. Free to members of the Society. *Subject Headings:* **1. Serial publications 2. Ice periodicals. I. British Glaciological Society II. Richardson, Mrs. H.** (*ed.*).—*D.M.G.*

12.3–212 551.324.433 551.324.8(479.1)

Tsomaia, V. Sh. and Kisin, I. M., **Nekotorye rezul'taty gliatsiologicheskikh rabot na lednikakh Addala-Shukhgel' v Dagestane.** [Some results of glaciological work on the Addala-Shukhgel' glaciers in Dagestan.] *Meteorologiia i Gidrologiia*, Leningrad, No. 8:40–42, Aug. **1958.** fig., table, 2 refs., eqs. **DWB, DLC**—In the summer of 1957 the Directorate of the Hydrometeorological Service of the Azerbaidzhan S.S.R. carried out an expedition on the Addala-Shukhgel' glaciers (4052 m) in order to obtain data on the accumulation and expenditure of moisture by the glaciers, to construct graphs of melting water yield, nourishment and runoff, etc. A comparison with observations of 1932 showed that the southern and southeast glaciers have no separate tongues; the tongue of the latter retreated 440 m from the right bank of the southern glacier during a period of 24–25 yrs. On the right bank of the trough dead ice, covered by thick layers of moraine material, has formed. The retreat of the southern glacier amounted to 88 m in the same period. The tongue shrunk by 17–20 m, i.e., their surface dropped 0.7–0.8 m a year on the average. During the 1957 observation period (Aug. 7–8) the number of sunshine hours per day varied from 0.1 to 12; mean daily air temperature ranged from $-1.7$°C to 15.3°C; the maximum daily melting was 9.8 cm; the mean daily melting was 4.7 cm. The melting coefficient for 1°C air temperature had a mean value of 0.65 cm. The ratio of runoff minus precipitation to melting layer was 0.90 which corresponds to the density of ice. In the period Aug. 10–17 the following data were obtained for the runoff balance:

| | |
|---|---|
| Runoff of water | $Q=513{,}562$ m$^3$ |
| Precipitation over water catchment area | $x=\ 44{,}450$ m$^3$ |
| Melting of ice | $h=489{,}177$ m$^3$ |

The runoff coefficient $Q/x+h=0.962$. *Subject Headings:* **1. Glacier research 2. Glacier variations 3. Glacial runoff 4. Addala-Shukhgel' glaciers 5. Dagestan A.S.S.R.**—*I.L.D.*

12.3–213 551.578.46:551.322:539.21

Nakaya, Ukichiro, **Visco-elastic properties of snow and ice in the Greenland Ice Cap.** *U. S. Snow Ice and Permafrost Research Establishment, Research Report* 46, May **1959.** 33 p. 49 figs., 3 tables, 16 refs., 20 eqs. **DWB, DLC.** (Also issued in: I.U.G.G. Association of Scientific Hydrology, **Symposium de Chamonix, Sept. 1958,** pub. Gentbrugge, **1958.** p. 199–212. 11 figs., 2 tables, 7 refs., 8 eqs.) **DWB**—The results of studies in the summer of 1957 on ice samples taken from the ice tunnel at TUTO, core samples obtained by drilling in the ice cap at Site 2, and snow samples, using the transverse vibration method and a new portable meter, are reported. Young's modulus was determined from the resonance frequency of flexural vibrations of samples cut in the form of rectangular bars; the loss factor was measured from damping; and the coefficient of viscosity calculated using the Maxwell model. The modulus of elasticity of samples of a density from 0.917–0.90 g/cm$^3$ (tunnel ice) decreased sharply with slight deviations of the density from that of pure ice. At densities from 0.90–0.50 g/cm$^3$ (deep-pit and drill-core samples) the relation between the modulus of elasticity and density was linear, while in the density range from o.50–0.25 g/cm$^3$ (surface snow) the modulus of elasticity decreased exponentially. The viscosity-density relation of the samples was similar to that of elasticity vs. density. Young's modulus increased slightly with decreasing temperature, while viscosity increased exponentially. The activation energy was calculated as 18.7 kcal/mol for old ice-cap ice, 13.9 kcal/mol for tunnel ice with elongated bubbles, and 13.5 kcal/mol for superimposed ice. *Subject Headings:* **1. Ice viscosity 2. Snow viscosity results 3. Greenland Ice Cap 4. Greenland.**—*Author's abstract.*

## F5. GRAVITY

12.3–214 551.241:526.7:550.34

†Woollard, G. P. (*Dept. of Geology, Univ. of Wisconsin*), **Crustal structure from gravity and seismic measurements.** *Journal of Geophysical Research*, Wash., D. C., 64(10):1521–1544, Oct. **1959.** 14 figs., 6 tables, 31 refs. **DLC**—Gravity data indicate that there is a regular relationship between crustal structure, crustal density, (composition), and surface elevation. Earthquake and surface seismic refraction and reflection evidence as to the composition and structure of the earth's crust have not yielded a simple, unambiguous relationship to the surface elevation. The velocity dispersion of earthquake surface waves, on the other hand, indicates variations in the thickness and composition of the crust that are in general accord with the variations in surface elevation and the Bouguer gravity anomalies. Why seismic refraction measurements have not agreed everywhere with gravity and surface wave indications of crustal structure appears to be a result of masking of crustal layering. On the basis of the slope of the curve that describes the relationship between the seismic depth to the Mohorovicic discontinuity and Bouguer gravity anomalies, the density difference between the crust and the mantle appears to decrease as the thickness of the crust increases. On the assumption that the mantle has a constant mean density of 3.32 gm/cc, the mean crustal density would appear to increase from a minimum value of 2.86 gm/cc in the oceans to about 3.08 gm/cc beneath the high plateaus and mountains. If the mean crustal density is essentially constant, the effective density of the mantle must decrease by a comparable amount. The existence of a low-density zone in the upper part of the mantle as suggested by the velocity dispersion of very long period Rayleigh waves, would explain the relationships observed. Isostatic relationships suggest that the mean density of the continental crust is essentially constant (2.85 gm/cc to 2.88 gm/cc). These values imply that a basaltic layer is present everywhere. That there is possibly an increase in mean crustal density as the crust thickens is suggested by USSR seismic studies in Central Asia. These show that the intermediate (basaltic) layer is usually thicker beneath areas of uplift. Although the origin of the basaltic layer can only be surmised, its general inhomogeneity, as indicated by variations of seismic velocity from 6.4 to 7.3 km/sec, and its varying thickness suggest that it may be a zone of phase transformation within the underlying mantle rock. Despite the lack of homogeneity in the crust, it appears possible that empirical relationships may be used to predict approximate crustal thickness from the regional Bouguer gravity anomalies or from surface elevations with a reliability approaching that for seismic measurements. *Subject Headings:* **1. Earth's crust 2. Earth models 2. Earth density measurements 4. Gravity measurements 5. Density measurements 6. Geophysics 7. Isostasy 8. Seismic measurements.**—*Author's abstract.*

12.3–215 550.34:526.74:551.241(798)

†Woollard, G. P.; Ostenso, N. A.; Thiel, E. et al., **Gravity anomalies, crustal structure and geology in Alaska.** *Journal of Geophysical Research*, Wash., D. C., 65(3):1021–1037, March **1960.** 7 figs., 4 tables, 18 refs. **DLC**—A regional Bouguer gravity anomaly map of Alaska is interpreted in terms of variations in crustal structure and local geology. The crustal results are compared with those determined from seismic measurements in two areas in Alaska and one in Alberta, Canada. These comparisons indicate the importance of including crustal composition in the derivation of crustal thickness from gravity values and suggest that regional isostatic anomalies are probably more indicative of abnormal crustal composition than of abnormal crustal thickness. In the Prince William Sound area of Alaska the seismic measurements show that the positive anomaly associated with the area is related to a thick crust having a high density rather than to a thin crust as might be deduced on the assumption of a normal crustal density. The inverse effect noted in the common association of negative anomalies with granitic intrusions appears to prevail in southern Alaska, where the seismic value of crustal thickness over the Coast Range batholith is less than that which would be deduced from the gravity anomaly values. Although the data are too sparse to permit any extended study of local geologic features several areas of local gravity anomaly are defined. In general, these can be correlated with known geologic features such as sedimentary basins, granite on basic rock intrusions, and the configuration of the buried crystalline rock surface. *Subject Headings:* **1. Gravity anomalies 2. Earth's crust 3. Seismic measurements 4. Alberta, Canada 5. Prince William Sound, Alaska 6. Southern Alaska.**—*Authors' abstract.*

# GENERAL METEOROLOGY

12.3–216 551.5

Rossby, Carl-Gustaf, **Current problems in meteorology.** (In: Bolin, Bert (*ed.*), **The atmosphere and the sea in motion.** N. Y., Rockefeller Institute Press, **1959.** p. 9–50. 18 figs.) "This article is a transl. of his **Aktuella meteorologiska problem,** published in *Svensk Naturvetenskap* [Yearbook], **1956,** of the Swedish Natural Science Research Council." **DLC** — A broad survey of a number of basic problems confronting meteorology today: radiation balance and heat storage in the sea and land; carbon dioxide in the atmosphere and sea and its cycle, the general circulation, numerical weather prediction of 3-dimensional atmospheric motions, air trajectories and their tracing, marine salts and their distribution and circulation, atmospheric chemistry (sulphur and ammonia, nitrogen, etc.) and the exchange of matter at the sea surface and, finally, attempts at weather control. The historical perspective, present situation and future prospects are discussed in each instance and the whole is illustrated by excellent color charts and figures. *Subject Heading:* **1. Problems in meteorology.**—*M.R.*

12.3–217 551.5:614.8

Montandon, Frédéric, **Les grandes catastrophes naturelles survenues pendant les années 1948 à 1957.** [The great natural disasters which occurred during the years 1948 to 1957.] *Revue pour l'Etude des Calamités*, Geneva, 16(36):58–60, Dec. **1959.** 2 tables. **DLC**—Account of the great natural disasters which occurred during the period 1948–1957. One table gives an analysis by calamity: mainland floods, storm surges, oceanic cyclones, continental tornadoes, earthquakes, volcanic eruptions, locusts, droughts, abnormal cold. A second table gives an analysis by countries or regions of the important natural disasters. Emphasis is given to two exceptional events, namely: the storm surge of the North Sea in 1953 and the 1956 abnormal cold in Europe. Continental inundations constitute the most disastrous calamity, followed by oceanic cyclones and continental tornadoes. Catastrophic earthquakes and volcanic eruptions were not numerous. *Subject Headings:* **1. Weather disasters 2. Storm surges 3. Cold winters 4. Floods 5. Tornadoes.**—*A.V.*

# METEOROLOGICAL OBSERVATIONS AND INSTRUMENTS

## METHODS OF OBSERVATION (551.501)

*See also:* **Photogeological methods** (Davies), 12.3–27; **Drift Station Alpha, Arctic** (Hunkins), 12.3–28; **Radar echoes from hail** (Battan), 12.3–50; **Aerial ice reconnaissance** (French), 12.3–56; **Radio astron.** (Laffineur), 12.3–118; **Radioelectric noise** (Haubert), 12.3–121; **Ionization data representation** (Rawer), 12.3–126; **Equivalents of wind velocity and the Beaufort scale** (Brogmus), 12.3–334; **Lapse rates during glaze** (Aleksandova), 12.3–375; **Determination of icing zones by radiosoundings** (Alt), 12.3–379; **Fog precip. measurement** (Kirigin), 12.3–383; **Observatory sites** (Polonska), 12.3–408; **Microclimat. data analysis** (Rauner), 12.3–428.

12.3–218 551.**501.4**:551.**511.33**(084.2)

*Fett, Walter, **Thermodynamisches Diagramm nach Stüve: Arbeitsblätter, Kurvenlineal und Geopotentialtabellen.** [Thermodynamic diagram according to Stüve: Work sheets, template and geopotential tables.] *Germany. Deutsche Demokratische Republik. Meteorologischer und Hydrologischer Dienst, Veröffentlichungen*, No. 17, **1958.** 41 p. 3 figs., 4 tables, 5 refs., 30 eqs. **DLC**—Radiosonde values are most rationally resolved into geopotential equivalents by using the thermodynamic diagram which is explained and demonstrated for synoptic as well as for statistical use. The work sheets appended are constructed in conformity with WMO specifications and the internationally accepted constants. A simple template is enclosed and its use for construction of a pressure-height-curve of adequate accuracy is shown. *Subject Headings:* **1. Thermodynamic diagrams 2. Pressure-height curves 3. Geopotential tables 4. Stüve diagram.**—*W.N.*

12.3–219 551.501.45:551.524.36(493) 551.58:519.24

Sneyers, Raymond (*Royal Met. Inst., Belgium*), **Sur la représentation des séries meteorologiques au moyen de processus aléatoires stationnaires persistants.** [Representation of meteorological series by means of random stationary persistent processes.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, Vienna, 10(2):232–242, **1960.** 4 tables, 7 refs., 13 eqs. French, German and English summaries p. 232. **DWB, DLC**—Two stationary and persistent stochastic processes are studied, the first of which is an autoregressive one of the first order and the second shows finite persistence. Both are applied to daily data of air temperature at Uccle and conclusions are favorable to the autoregressive scheme. In these conclusions the examination of the dependence-properties of the fundamental series as well as of the derived series plays a predominant part. *Subject Headings:* **1. Stochastic processes 2. Temperature calculations 3. Statistical methods in climatology.**—*Author's abstract.*

12.3–220 551.501.5:551.58:912

Robinson, Arthur and Bryson, Reid A. (*both, Univ. of Wisc.*), **Method for describing quantitatively the correspondence of geographical distributions.** *Association of American Geographers, Annals*, 47(4):379–391, Dec. **1957.** 5 figs., table, foot-refs., eq. **DWB**—More precise and sophisticated methods of cartographic coordination than those in general use in climatic atlases or regional geographic studies are outlined and illustrated by an example of linear regression from E-W profiles of Nebraska's farm population density and annual precip. from grid values. Sources of error, applications not involving mapping, and the orthogonal polynomial method (curvilinear regression) of TSCHEBYCHEFF described and the latter illustrated to show the relative improvement in the maps, made by using conventional, linear and curvilinear techniques. *Subject Headings:* **1. Cartographic techniques in climatology 2. Rainfall-population relationships 3. Orthogonal polynomials 4. Nebraska.**—*M.R.*

12.3–221 551.501.5:551.552 551.501.5:551.58

Untersteiner, N. (*Vienna*), **Eine neue Methode der Darstellung kleinraumiger Windfelder für praktisch-klimatologische Zwecke.** [New method for presenting small-scale wind patterns for purposes of practical climatology.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, Vienna, 10(2):222–227, **1960.** 2 figs., 2 tables, 2 refs. German, English and French summaries p. 222. **DWB, DLC**—A simple graphical method is described to present the mean simultaneous wind speeds and directions at two neighboring locations. The method is suitable for the description of local wind fields for applied climatological purposes. *Subject Headings:* **1. Wind pattern representation 2. Graphical methods in climatology.**—*Author's abstract.*

12.3–222 551.501.71:535.243:551.510.41:546.132

West, Philip W. and Coll, Hans (*both, Coates Chemical Lab., Louisiana State Univ.*), **Spectrophotometric determination of chloride in air.** *American Geophysical Union, Geophysical Monograph*, N. 3:37–42, **1959.** 2 figs., tables, 6 refs. **DWB, DLC**—In this paper a spectrophotometric method to obtain a rapid quantitative estimation of chloride, twice as sensitive as the turbidimetric determination, is explained. The procedure is to measure the light-absorption of the iron chloro complex in perchloric acid at 350 m$\mu$. For simplicity and sensitivity an adaptation of this method is suggested; namely to perform the sampling by bubbling air through the ready-made reagent, that is, through a solution of iron perchlorate in perchloric acid. A resume of the experiments carried out to test this method and their results along with details of apparatus and reagents are given. *Subject Headings:* **1. Spectrophotometric method 2. Chloride content of air 3. Atmospheric chemistry.**—*I.S.*

12.3–223 551.501.721:551.521.32

Möller, Fritz (*Johannes Gutenberg Univ., Germany*), **Measurement of atmospheric radiation by a black ball.** *Journal of Meteorology*, Boston, 16(1):87–90, Feb., **1959.** 2 figs., 6 refs., eqs. **DWB, DLC**—The author presents a detailed analysis of GERGEN's opinion (*see* 10.3–244, March 1959, *Met. Abs.*) that the temperature measured by a black ball not only gives the temperature of the radiation equilibrium of a black body within the atmosphere but the radiation equilibrium temperature of the air itself. According to the explanation of GERGEN the difference $\theta_r$ between the temperature $T_r$ of the black ball and the air temperature $T_a$ is proportional to the rate of change of the air temperature $\partial T_a/\partial T$ under the influence of heat radiation. GERGEN's measurements for a layer of some kilometers above and below the troposphere give during summer $\theta_r > 0$ and during the winter $\theta_r < 0$; under the influence of long wave radiation heating should occur in summer and cooling in winter. "This contradicts all theoretical consideration according to which cooling has to be deduced within the whole atmosphere." Heating can occur only very close to the lapse rate. These layers of heating, however, have a thickness of a few 100 m only and never of many km as inferred from GERGEN's measurement. The author shows that this contradiction arises from GERGEN's theoretical deductions from which strict proportionality between $\partial T_a/\partial T$ and $\theta_r$ can be deduced only when the atmosphere is a grey absorber. It is concluded that measurements of the black ball do not give a measure of the heating rate of the air. *Subject Headings:* **1. Atmospheric radiation measurements 2. Radiation equilibrium temperature of air 3. Black ball.**—*I.L.D.*

12.3–224 551.501.721:551.521.1(469)

Morais, J. Custódio de (*Dir. Instituto Geofísico, Coimbra, Portugal*), **Radiação global e insolação em Coimbra: valores observados de 1955 a 1958 e calculados até 1931.** [Global radiation and insolation in Coimbra: observed values from 1955–1958, and calculated back to 1931.] *Coimbra, Tipografia da Atlantida,* **1959.** 12 p. 2 figs., table, 11 refs., eqs. **DWB** (M21.1 M827 a)—The author, starting from relative values of bright sunshine as measured by a Campbell-Stokes recorder, and from the values of global radiation on a horizontal surface, with a pure and dry atmosphere (Rayleigh atmosphere), obtained the empirical relation

$$Q = Q_R(0{,}76\, s/S + 0.16)$$

where $Q$ is the radiation obtained with the relative insolation $s/S$, $Q_R$ is the global radiation with the Rayleigh atmosphere. This relation was obtained with decades of the years 1955 to 1958, and afterwards applied to the years back to 1931. Some years ago the Portuguese engineer, A. TEMUDO BARATA, obtained the similar constants 0.55 and 0.18 but used the radiation without atmosphere. *Subject Headings:* **1. Global radiation measurement 2. Global insolation measurement 3. Coimbra, Portugal.**—*Author's abstract.*

12.3–225 551.501.75:551.554:551.542.1

Boyden, C. J., **A method of fitting isobaric contours to the gradient wind.** *Meteorological Magazine,* London, 89(1052):68–70, March **1960.** 2 figs., 2 eqs. **DWB, DLC**—There are various methods for calculating the gradient wind from the pressure gradient, but no method exists for spacing the isobars to fit a flow of known velocity. Usually when upper air observations are sparse, the analyst has to use observed winds as gradient winds. The cyclotrophic element is too large to be ignored. It is a common practice to make allowance for it. The percentage correction is obtained more precisely by taking the contour of the flow to be that of contours near the point of observation and using the observed wind speed minus the component of velocity of the local contour. *Subject Headings:* **1. Gradient wind calculations 2. Isobaric contours.**—*A.H.K.*

12.3–226 551.501.75:551.558

Dubov, A. S., **K voprosu opredeleniia vertikal'nykh skorosteĭ vetra po dannym samoletnogo akselerografa.** [The problem of determining vertical wind velocities from the data of an airplane accelerograph.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy,* No. 81:73–84, **1959.** 5 figs., 4 tables, 5 refs., 36 eqs. **DLC**—The determination of vertical gusts of wind from airplane bumpiness is summarized briefly. Its various defects are noted, namely: inexact measurement of the angle of tangency and of the wind velocity relative to the atmosphere, the increase of the angle of tangency, and the coefficient of lifting force are mutually dependent. By using equations of the motion of the center of gravity of an airplane along the horizontal and the equation of moments it is possible to eliminate the number of recording elements of the motion of the aircraft and the need of recording the angle of tangency. Proceeding from the differential equations of M. I. Iudin, describing the effect of wind gusts upon an aircraft, namely

$$\frac{d\phi_1}{dt}+a_{11}\varphi_1+a_{12}\varphi_2+a_{13}\varphi_3=a_{11}u_1+a_{12}+u_2$$

$$\frac{d\phi_2}{dt}+a_{21}\varphi_1+a_{22}\varphi_2-a_{23}\varphi_3=a_{21}u+a_{22}u_2$$

$$\frac{d^2\varphi_3}{dt^2}+a_{44}\frac{d\varphi_3}{dt}+a_{41}\varphi_1+a_{42}\varphi_2-a_{43}\varphi_2=a_{41}u_1+a_{42}u_2+b_{43}\frac{du_2}{dt}$$

where $\varphi_1$ and $\varphi_2$ = pulsation of horizontal and vertical center gravity of the airplane relative to the earth in fractions of the velocity of the fundamental established velocity of the airplane; $\varphi_3$ = pulsation of angle of tangency; $u_1$ and $u_2$ = pulsations of wind velocity relative to the mean airplane velocity; constant coefficients $a_{ij}$ and $b_{34}$ depends upon constructional and aerodynamic characters of the airplane and on the velocity and height of flight; and $t$ = non-dimensional time. The derivation of the equation for vertical velocity and their application to particular airplanes are presented. *Subject Headings:* **1. Vertical gust velocity measurement 2. Airplane accelograph data.**—*I.L.D.*

12.3–227 551.501.776:551.576

Takács, L. and Zách, A., **Über die Observabilität der nächtlichen Bewölkung.** [Observability of cloudiness at night.] *Időjárás*, Budapest, 63(4):199–206, July/Aug. 1959. 2 figs., 3 tables, 4 refs. English summary p. 199; Hungarian summary p. 206. **DLC**—According to the hitherto accepted opinion the estimation of cloudiness at night does not present many more difficulties than that during the day, because a good orientation for the observer even on moonless nights is given by the visibility of the stars. On the basis of hourly cloud-observations, taken from synoptic observations in Budapest, for the period of 10 years it can be stated that the different kinds of cirrus and of the thin stratus clouds can not be properly observed at night. The yearly average of the apparent nightly decrease of cloudiness is about 6–7%. *Subject Headings:* **1. Cloud observation at night 2. Budapest, Hungary.**—*Authors' abstract.*

12.3–228 551.501.9:551.594

Mühleisen, R., **Vorschläge zur Zusammenarbeit luftelektrischer Stationen, Wahl der Standorte, Arbeitsmethoden.** [Suggestions on the cooperation of atmospheric electricity stations, site selection, and working methods.] (In: Israel, H. (*ed.*), **Luftelektrizität im A.G.I.: Bericht über die Tagung in Aachen am 11.–12. Mai 1956.** Pub. Aachen, **1957.** p. 117–120.) **DWB**—The paper contains three categories for which specifications are listed: (1) balance of the air-electrical currents (2) choice of station sites and (3) calibration and recording. The quantities to be checked along with their symbols, coding, instrumentation and standard of representation are also included. *Subject Heading:* **1. Atmospheric electricity stations.** —*W.N.*

## OBSERVATIONAL DATA (551.506)

*See also:* **Monthly climat. data, Macao** (Ferreira), 12.3–15; **Pressure, temp. and precip. data, N. Hemisphere** (Sokhrina et al.), 12.3–17; **IGY met. data** (McMurray), 12.3–19; **Exped. data, Antarctica** (Steinhauser), 12.3–21; **Observations on glaciers, Mt. Kenya** (Charnley), 12.3–22; **Radio observation of meteors** (Hagfors), 12.3–116; **Meteor data** (Dubin, Campen), 12.3–117.

12.3–229 551.506.1:551.582(54) 550.38(058)(54)

*India. Meteorological Dept., **Magnetic, Meteorological, Atmospheric Electric and Seismographic Observations made at the Government Observatories Bombay and Alibag [Vol. 62] 1950.** pub. Delhi, **1955.** Each section repaged. 5 plates (fold.) almost entirely tables. **DWB**—A large and extensive compilation of hourly or several times daily observations of pressure, rainfall, wind speed, and direction, air temperature, relative humidity, cloud, visibility and magnetic declination, horizontal and vertical force, by months. In addition instruments and exposures are described in detail, the weather for the year analyzed, atmospheric electricity and seismological records presented. This is the 62nd volume of its kind issued by the observatory covering 95 years of meteorological and magnetic observations, and 10 years of atmospheric potential gradient observations. Colaba Observatory, Bombay, is at 18°53′36.18″N and 72°48′54.03″E, and Alibag Magnetic Observatory 18°38′17″N and 72°52′21″E. *Subject Headings:* **1. Annual meteorological data summaries 2. Observational data 3. Geomagnetic yearbooks 4. Colaba Observatory, Bombay 5. Bombay, India. I. Savur, S. R.**—*M.R.*

12.3–230 551.506.3:551.515.4(474.5)

*Raliene, J. and Tyliene, E., **Lietuvos TSR ir Kaliningrado srities perkūnijos.** [Thunderstorms in Lithuanian S.S.R. and Kaliningrad district.] *Leituvos TSR Mokslų Akademija. Geologijos ir Geografijos Institutas, Geografinis Metraštis,* 1:203–212, **1958.** fig., 7 tables, 4 refs. Russian and English summaries p. 211–212.—On the basis of the data for the period 1947–1956, statistic-climatic characteristics of thunderstorms in Lithuania and the Kaliningrad district are given in this article. The main synoptic situation of thunderstorms is analyzed. On the average, there are in Lithuania 23 days with thunderstorms per annum, 40% of which are of an intermassic and 60% of frontal origin. Summer thunderstorms start in the beginning of April and stop at the end of September. *Subject Headings:* **1. Thunderstorm distribution 2. Thunderstorm frequencies 3. Synoptic conditions for thunderstorms 4. Lithuanian S.S.R. 5. Kaliningrad, Kaliningradsk Region, U.S.S.R.**—*Authors' abstract.*

12.3–231 551.506.3:551.553.8(52)

*Tanaka, T., **Some characters of gale in Suttsu District, Hokkaido.** *Journal of Meteorological Research,* Tokyo, 10(7):596–602, July **1958.** 14 figs., 7 tables, ref. In Japanese. **DLC**—A southeasterly gale prevailing in Suttsu District, Hokkaido, from May to July is studied with data from 1952–1956 and upper wind data from 1957. The gale, which is mainly due to transitional high or the Okhotsk high, lasts usually for 2–3 days and sometimes for a week. The peak times of the gale blowing toward the ocean are 6 a.m. and 10 p.m. The vertical altitude, propagation region, causes, the influences on the ocean surface condition, and the techniques for forecasting gales are discussed with graphed and tabulated data. *Subject Headings:* **1. Gales 2. Gale forecasting 3. Suttsu District, Japan.**—*J. H. WOO.*

## INSTRUMENT CARRIERS (551.507)

*See also:* **Aerobee-rocket photograph of sun** (de Jager), 12.3–106.

12.3–232 551.507.2:551.508.824

Powell, B. W., **Unmanned ocean weather stations.** *Weather,* London, 13(11):364–368, Nov. **1958.** photos. **DWB**—A description with the aid of photographs of the construction and operation of two remote reporting ocean based weather stations, developed by Lowell W. Hokkaninen and L. M. Allison at the United States Bureau of Standards. The "weather boat," 20 ft long and 10 ft wide, and made of aluminum, can be moored in waters up to a depth of 3600 ft. The air temperature and water temperature sensing devices are thermistors. A precision barometer is so modified that a slave needle acting in accord with it rides above a resistance strip and clamps to the strip at the time of actual measurement. Wind is measured by a three-cup anemometer which drives a small permanent magnet generator whose output goes to a grid in a vacuum tube. The wind vane is connected to a selsyn transmitter and receiver circuit which activates a servo system and adjusts a magnetic compass synchronously with the position of the wind vane. Limiting ranges on actually recorded and broadcast data are as follows: air temperatures between −25°F and +110°F, water temperatures between 15°F and 90°F, and barometric pressure between 950 and 1050 mb and wind speed from 0 to 68 knots. The broadcasting system is described. The second ocean based weather station is the AWRS (automatic weather reporting station) buoy. It weighs about 375 lbs and is nearly 30 ft long with about 13 ft of this below the waterline. These buoys transmit for a period of about 4 min. every six hours. *Subject Headings:* **1. Ocean weather stations 2. Automatic weather stations.**—*I.L.D.*

## INSTRUMENTS (551.508)

*See also:* **Thermometry** (Popov), 12.3–3; **Automatic ocean weather stations** (Parvell), 12.3–232; **Surface energy balance computers** (House et al.), 12.3–342; **Determination of icing zones by radiosoundings** (Alt), 12.3–379; **Icing of radiosondes** (Kitaoka et al.), 12.3–380; **Instruments for measuring hydrometeors** (Levert, Scharringa), 12.3–384.

12.3–233 551.508.25:551.521.18

Lachenaud, Martial, **Sur les possibilités de réalisation de systèmes optiques pour le moyen et le lointain infrarouge avec des mono-cristaux synthétiques artificiels.** [The possibilities of developing optical systems for the middle and far infrared with artificial synthetic monocrystals.] *Revue d'Optique*, Paris, 38(12):541–555, Dec. **1959.** 6 figs., 2 tables, 12 refs. French and English summaries. **DLC**—The industrial manufacture of artificial synthetic monocrystals, having no equivalents in nature, allows the construction of optical systems providing images in the middle and far infrared regions. The new materials (thallium bromoiodide, silver chloride and caesium bromide) suitable for this purpose are examined as to their optical qualities. Thallium bromoiodide, mixed with caesium bromide makes possible the achievement of achromatic combinations corrected for spherical aberration and coma up to about $4\mu$. If it was possible by adding some substances to make silver chloride micro-hard enough to be polished, this material similarly combined with caesium bromide would be effective up to $15\mu$ and even further. Neglecting the achromatism condition, the use of thallium bromide alone enables spectrometer lenses to be devised which would be able to operate up to $35\mu$ and to project large spectral ranges on an inclined receiving surface. Specifications of the various systems designed to meet the above requirements are given as examples. *Subject Headings:* **1. Infrared radiation measurement techniques 2. Infrared spectroscopy.**—*Author's abstract.*

12.3–234 551.508.54:551.55

Svarchevskiĭ, V. N., **Pribor dlia registratsii bol'shikh skorosteĭ i poryvistosti vetra.** [Instrument for recording great wind velocities and gustiness.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 83:43–49, **1958.** 9 figs., 8 refs. **DWB, DLC**—The principle and design of a new device making it possible to record great wind velocities (60 m/sec or more) and gustiness, successfully tested at the Markhotskiĭ Perevalo Hydrometeorological Station near Novorossisk in 1957 and 1958, are presented and described. A pendulum system with a lamellar-spherical receiver on a Cardan joint has been put in the base of the instrument. A non equipoderant bridge circuit making it possible to measure the resistance at the deviation of the pendulum is used for the remote transmission of pendulum oscillation. Several figures and photos of the different parts of the device and of its electric circuit are included. *Subject Heading:* **1. Wind velocity measurement instruments.**—*A.M.P.*

12.3–235 551.508.56:551.551

Davidson, Ben, **Observations and theory of local wind systems.** N. Y. College of Engineering. Research Div. Dept. of Meteorology and Oceanography, Contract DA-36-039-Sc-78127, Quarterly Progress Report No. 4, Oct. 1–Dec. 31, **1959.** 17 p. 2 figs., table, numerous eqs. **DWB** (M(051) N5321o(—Analysis of the observational error implicit in the double theodolite system is made. The technique of editing the data is described and estimates of the overall accuracy of the double theodolite data are given. *Subject Headings:* **1. Wind systems 2. Double theodolite system.**—*Author's abstract.*

12.3–236 551.508.762

Früngel, Frank, **Der impulsoptische Wolkenhöhenmesser.** [Optical pulse cloud height meter.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, Vienna, 10(2):243–251, **1960.** 4 figs., 12 refs. German, English and French summaries p. 243. **DWB, DLC**—The principle of trigonometric measurements of cloud heights was developed, by means of pulse light of very high maximum brightness (rare gas spark gap), to a full-automatic recording apparatus characterized by independence on day light, the possibility of measuring great heights from 1000 to 3000 m, and simple elements of construction. The lower limit as well as the kind of clouds are recorded. *Subject Headings:* **1. Cloud height measurement techniques 2. Cloud meters.**—*Author's abstract.*

12.3–237 551.508.92:551.591

Früngel, Frank, **Ein impulsoptisches Transmissometer für Registrierung der Normsichtweite zwischen etwa 40 m und ∞ (Videograph).** [Optical pulse transmissometer for recording standard visibility from about 40 m to ∞ (Videograph).] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, Vienna, 10(2):252–263, **1960.** 6 figs., 18 refs. German, English and French summaries p. 252. **DWB, DLC**—A transmission-measuring apparatus was constructed on the principle of transmitting impulse-optic signals by means of spark light as transmitter and a photo-electric cell as impulse receiver. The transmitter shows no disturbing variations of intensity if the spark gap is operated under the critical value. The measuring range of extinction amounts to 1:$10^5$ corresponding to a normal range of visibility from about 40 m to infinity. The apparatus is designed for airports. A simple telephone cable serves as connection with the recording system. *Subject Headings:* **1. Transmissometers 2. Visibility measuring devices 3. Airport visibility measurement techniques.**—*Author's abstract.*

12.3–238 551.508.93 551.591:629.139

Stevens, Norman B.; Horman, Melvin H. and Dodd, Edward E., **The determination of atmospheric transmissivity by backscatter from a pulsed-light system.** Motorola Inc., Riverside Research Lab., Calif., Contract AF 19(604)-2213, July **1957.** 131 p. 36 figs., table, eqs.—When an aircraft approaches a runway, the pilot must recognize the runway lights while sufficient altitude remains to permit course correction. The prediction as to when the lights will be seen must be made from the ground, preferably by measuring the transmission loss in the approach path. The feasibility of determining visual range along the slant path by observing the light scattered by the atmosphere from a pulsed beam of transmitted light was investigated experimentally and theoretically. Three configurations were considered, in which the receiver and transmitter were coaxial, separated laterally, and separated in range. The experimental equipment produced useful signals at night from ranges of 1000 to 2000 ft. Although this range is not adequate, extrapolations of the data indicate the advisability of assembling a larger system as a means of securing larger ranges. *Subject Headings:* **1. Visibility measuring devices 2. Atmospheric transmission 3. Airport visibility.**—*Authors' abstract.*

12.3–239 551.508.94:551.594.221

**New weather warning system under test.** *Weatherwise*, Boston, 13(2):63, April **1960.** photo. **DWB**—Describes the new automatic weather system under test in Central U. S. It is a very efficient system and capable of detecting lightning at a distance of 2000 mi. The detector stations can pick up static generated by lightning. An observer can watch lightning accurately over most of North America with special electronic equipment. *Subject Headings:* **1. Weather warning system 2. Lightning detection.**—*A.H.K.*

## SYNOPTIC ANALYSIS AND FORECASTING (551.509)

*See also:* **Numerical forecasting,** 12.3–13; **Upper air wind forecasting** (Sorenson), 12.3–43; **Tropopause forecasting** (Sorenson), 12.3–44; **Forecast error effects in jet flight** (Pike et al.), 12.3–45; **Long range forecasting** (Neumann), 12.3–186; **Gale forecasting, Suttsu District** (Tanaka), 12.3–231; **Baroclinic waves in a rotating fluid** (Fultz, Kaylor), 12.3–274; **Lapse rate during glaze** (Aleksandrova), 12.3–375; **Determination of icing zones by radiosounding** (Alt), 12.3–379; **Bai-u rainfall forecasting** (Sugaya, *comp.*), 12.3–399; **Weather types** (Vowinckel), 12.3–443.

12.3–240 551.509.312:551.511.13

Haltiner, G. J. and Wang, Yeh-chun (*Naval Postgraduate Sch., Taiwan*), **Numerical prognosis including non-adiabatic warming.** *Journal of Meteorology*, Boston, 17(2):207–213, April **1960.** 9 figs., table, 5 refs., 20 eqs. **DWB, DLC**—A model for numerical prediction of the 1000 mb surface is developed which includes a term expressing the interchange of sensible heat between the air and the underlying surface as well as the effect of terrain-induced vertical motion. In spite of the crudeness of the nonadiabatic representation, the model shows a definite improvement over a similar adiabatic model when the two are compared in a series of prognoses. Moreover, when monthly mean isotherms may be used to represent the temperature of the underlying surface, the nonadiabatic term may be combined with the orographic term and the earth's vorticity so that there is no work added to the prognostic routine. *Subject Headings:* **1. Numerical forecasting 2. Nonadiabatic heating.**—*Author's abstract.*

12.3–241 551.509.**312**:551.509.**317**

Jess, Edward O. (*U. S. Air Force*), **A numerical prediction experiment involving data paucity and random errors.** *Tellus*, Stockholm, 12(1):21–30, Feb. **1960.** 7 figs., table, 12 refs. **DLC**—500 mb prognoses computed with a barotropic model from progressively lessening amounts of data, showed increasing statistical differences. These differences also grew with the passage of time. With increasing paucity of data, the smaller meteorological features disappeared, while larger features were smoothed and suffered a change in speed of motion. Random errors, which simulated a natural error source, were added to the data. This appeared to intensify and decelerate the features on the prognostic charts. *Subject Headings:* **1. Numerical forecasting 2. 500 mb prognostic charts 3. Barotropic models.**—*Author's abstract.*

12.3–242 551.509.**312**:519.28

Solonin, S. V., **K voprosu o primenenii ekstrapoliatsionnykh formul dlia prognoza peremeshchenia baricheskikh tsentrov.** [Application of extrapolation formulas for forecasting the movement of baric centers.] *Meteorologiia i Gidrologiia*, Leningrad, No. 1:30–32, **1958.** 3 tables, 4 refs. **DWB, DLC**—S. S. Kliucharev's method of forecasting pressure centers 24 hours in advance with the formula $u=-l(b_1-b_2/0.5(p_1+p_2)-p_0$ (where $u$=velocity of point $p_0$ [in hundreds of km/24 hours]; $l$=distance between centers of regions of rise and fall of pressure associated with the given pressure structure $b_1$ and $b_2$; $p_1$ and $p_2$=corresponding baric tendency and pressure) was checked against extensive synoptic material and compared with the results obtained with the method of L. S. Gandin. The relationship of means of the absolute magnitudes of vector differences between computed and actual velocities to the means of the absolute magnitudes of the actual velocities $|\overline{\overleftarrow{v\Delta}}|/\bar{v}$ for the method of Kliucharev was equal to 47% and for that of Gandin—38%. The mean absolute deviations $|\overline{\Delta\alpha}|$ of the predicted directions of movement of the baric centers from the actual is 20° according to the method of Kliucharev and 16° according to Gandin's procedure. In order to forecast the position of baric centers for 24-hours the method of Gandin is more useful. The formula of Kliucharev is useful for estimating the velocity of movement of centers but the directions must be determined more precisely by other procedures. *Subject Headings:* **1. Pressure forecasting 2. Extrapolation formulas 3. Short range forecasting.**—*I.L.D.*

12.3–243 551.509.**313**:551.509.**324.2**

Brandejs, Stanislav and Zikmunda, Otakar, **Über die graphische Vorhersage der Niederschlagsintensität.** [Graphical forecasting of precipitation intensity.] *Studia Geophysica et Geodaetica*, Prague, 2(2):186–189, **1958.** 7 refs., 13 eqs. Russian summary p. 189. **DWB**—The Geophysical Inst. of the Czech Akademy of Science has tested the Estoque (1957) (8E-10, May 1957, *Met. Abs.*) method of quantitative precipitation forecasting by graphical integration in connection with their own graphical forecasting of the surface pressure patterns, and a concrete example for a particular weather situation worked out. The prognostic equations are developed from a baroclinic model with consideration of relative divergence and resulting vertical motions. Limitations introduced by the many assumptions and neglectings are discussed, especially with respect to connective as contrasted with frontal precipitation. *Subject Headings:* **1. Graphical precipitation forecasting 2. Quantitative precipitation forecasting 3. Estoque graphical method.**—*M.R.*

12.3–244 551.509.313:551.511:551.557.2

Gandin, L. S. and Alimova, T. A., **K voprosu o statsionarnosti sglazhennykh potokov, primeniaemykh v grafoanaliticheskikh metodakh prognoza.** [Problem of plane stationary currents with application to graphic methods of forecasting.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 81:58–63, **1959.** 2 figs., 3 tables, 2 refs., 2 eqs. **DLC**—On the basis of empirical material, the authors present a comparative analysis of the behavior of diverse smoothed stream lines especially in relation to their degree of nonstationary character. The initial material consisted of maps of surface pressure and of the geopotential of the 850, 700 and 500 mb surface for 10 periods succeeding each other at 12 hours intervals and covering the period Jan. 22–26, 1956. Smoothing was carried out according to the method of IUDIN and FJØRTOFT. The visual analysis of the smoothed stream lines indicates that their fields are substantially smoother and less nonstationary than the fields of corresponding real stream lines. The degree of smoothness and nonstationary state differed from the smoothed stream flow constructed by different procedures. The stream flows constructed according to the method of IUDIN were subject to smaller scale disturbances than those constructed according to the method of FJØRTOFT. The objective characterization of the degree of non-stationary state of different stream flows is expressed by

$$\alpha = \frac{|M\Delta|}{|M-M|} \quad \text{and} \quad \beta = \frac{(\Delta V)^2 + V_M{}^2(\theta\Delta\delta)^2}{\tilde{V}^2}$$

where $M$ = corresponding smoother stream flow; $V$ = magnitude and $\delta$ = direction of vector velocity of the geostrophic wind in the field $M$; $\Delta$ = increase of corresponding magnitude during a 12 hour period; line = indicates mean for all points of the network for a given time interval; wavy line = means for all points and periods; $Vm$ = mean velocities for beginning and end of the 12-hour interval. Calculations of $\alpha$ and $\beta$ are presented in a table. The coefficients for $\beta$ indicates that the Iudin method gives a considerable less degree of non-stationary state than that of Fjørtoft. The coefficient *a* becomes very small as a result of smoothing. *Subject Headings:* **1. Graphical forecasting methods 2. Stationary currents.**—*I.L.D.*

12.3–245 551.509.313

Knighting, E. (*Met. Office, Dunstable*), **On the grid length to be adopted in numerical weather prediction.** *Royal Meteorological Society, Quarterly Journal*, 86(368):265–270, April **1960.** 5 figs., table, 12 eqs. **DWB, DLC**—The predictive equations of numerical forecasting are cast in differential form and do not have simple analytic solutions. In practice, the finite-difference analogues of the differential equations are solved using a grid and the grid length has been chosen so that significant features of the synoptic chart are reasonably defined by values at the grid points of contour height or pressure. The purpose of this note is to enquire into the grid lengths that should be chosen so as to make the best estimate of the derivatives which appear in the equations. *Subject Headings:* **1. Numerical forecasting 2. Grid lengths in numerical predictions.**—*Author's summary.*

12.3–246 551.509.317:551.557.2

*Smith, C. V., **Synoptic evolution of 500-millibar flow patterns: a medium-range forecasting aid.** *Great Britain. Meteorological Office, Meteorological Reports*, 3(21), **1959.** 67 p. 26 figs., table, 12 refs. **DWB**—The common modes of evolution of some characteristic flow patterns at 500 millibars are examined. The approach is primarily descriptive and the behaviour of troughs and ridges, "blocks" and "jets" is discussed with the aid of sequences of 500 millibar charts. Where possible, criteria are presented to distinguish between the probable alternative evolutions. The relation between 500 millibar and surface synoptic features is treated briefly in an appendix. *Subject Headings:* **1. 500 mb flow patterns 2. Medium range forecasting.**—*Author's summary.*

12.3–247 551.509.318:551.509.322:629.12

Antipova, E. G., **Sinopticheskie usloviia rezhima vetra na iuge Barentseva i Karskogo moreĭ v navigarsionnyĭ period.** [Synoptic conditions of the wind regime in the southern part of the Barents and Kara Seas during the navigation period.] *Moscow. Tsentral'nyi Institut*

*Prognozov, Trudy*, 73:3–28, **1958.** 10 figs., table, 6 refs. **DWB**—The weather conditions are studied for forecasting the winds favorable for navigation of the river boats and barges from the estuaries of Ob, Yenisei, in the White and other northern seas. Favorable combination of winds with the hydrological factors (currents, waves and swells) are discussed on the basis of the data observed along various points of the shore line from the Arkhangelsk to the estuary of the Yenisei river, shown on the map (Fig. 1) and two charts of wind frequencies. Periodic synoptic conditions favorable and unfavorable for the navigation of the river boats are described with details illustrated on nine maps with mean values of $AT_{500}$ and centers of cyclones and anticyclones diagramatically arranged on the isohypses. Possibilities of the forecasting of favorable winds for navigation are outlined for different periods on the basis of the combined kinematic maps for corresponding periods and kind of synoptic processes. The results of this analysis are summarized in respect to: favorable months of year, wind velocity variations along the coastal line, frequency of repetition, coastal topography effect and the intensities of synoptical processes. *Subject Headings:* **1. Wind regime 2. Wind forecasting 3. Navigation 4. Barents Sea 5. Kara Sea.**—*N.P.S.*

12.3–248 551.509.323.2(252)

Kangieser, Paul S. (*U. S. W. B. Airport Station, Ariz.*), **Forecasting minimum temperatures on clear winter nights in an arid region: comparison of several climatological aids.** *Monthly Weather Review*, Wash., D. C., 87(1):19–28, Jan. **1959.** 5 figs., 5 tables, 13 refs., 9 eqs. **DWB, DLC** –Minimum temperature formulas for clear nights in Dec., Jan., and Feb., are developed by the Young method and tested on both original and test data. The results of these tests lead to a discussion of some weaknesses of the "method of arbitrary corrections." JACOBS' graphical adaptation of Brunt's equation is tested (a) using experimentally determined values for the local soil constants to compute the "effective" soil factor, and (b) using a soil factor determined empirically for local meteorological data. With Brunt's equation as a model, the physical justification for Young's method is discussed, and a more direct approach suggested using the evening dry bulb and wet bulb temperatures and a modern method of data analysis. There is further discussion of some implicit assumption in the Young method of analysis and an attempt is made to see if these assumptions are satisfied by the analysis performed in combining the evening dry bulb and wet bulb temperatures and the expected morning minimum using modern methods. In the Appendix, the application of the latter method is extended to cloudy nights and performance comparisons with official forecasts are made and discussed. *Subject Headings:* **1. Minimum temperature forecasting 2. Method of arbitrary corrections 3. Young's method of analysis.**—*Author's abstract.*

12.3–249 551.509.323.2:551.524.37

Veitch, L. G., (*C. S. I. R. O. Division of Mathematical Statistics*), **Frost forecasting in the Barossa Valley, South Australia.** *Australian Meteorological Magazine*, Melbourne, No. 25:29–45, June **1959.** 5 figs., 3 tables, 2 refs., eq. **DWB**—After a brief history of the frost service, the relationship between expected minimum temperature and frost risk is discussed. The appropriate physical and statistical aspects of the problem are considered so that the determining variates used in multiple regression will have a sound theoretical basis. The regressions, using information available at 1800 Central Standard Time explain about 70 per cent of the variation in minimum temperature. This result is superior to that obtained from subjective techniques. The absence of suitable measurements of soil-moisture and of radiation appear to be the chief obstacles to a more complete solution of this problem. *Subject Headings:* **1. Frost forecasting 2. Statistical methods.**—*Author's abstract.*

12.3–250 551.509.33:551.509.542

*Abbot, Charles G., **Long-range forecast of United States precipitation.** *Smithsonian Miscellaneous Collections*, Wash., D. C., 139(9), March 23, **1960.** 78 p. 12 figs., charts, 15 tables, foot-refs. **DWB** (M09.324 A126Lo)—The present study introduces and describes a new method of long-range forecasting. The method is based on the assumption that regular periodic cycles, integrally related to a fundamental cycle, exist in weather. It is claimed that by determining their average forms and amplitudes for intervals of a thousand months, successful forecasts may be made for years to come, or even backcasts may be made for former years and compared to former events. To illustrate the thesis, first, illustrative forecasts for the years 1950 to 1958 are shown and compared with the records of that interval graphically, and then, the method is explained and forecasts are given to 1967 for 32 cities of the United States. *Subject Headings:* **1. Long range precipitation forecasting 2. United States.** –*I.S.*

12.3–251 551.509.324:681.177:551.577.2(82)

De Fina, Armando L. and Sabella, Luis J., **La predicción de las áreas de lluvia por el nuevo método casi objective RDF.** [Prediction of precipitation areas by the new semi-objective RDF method.] *Revista de Investigaciones Agricolas*, Buenos Aires, 12(3):247–297, **1958.** 10 figs., 6 tables, 9 refs. **DLC**—Reprinted as *Argentina. Instituto de Suelos y Agrotecnia, Publicación*, No. 61, **1958.** Spanish, English, French and German summaries p. 294-296. **DWB**—The nearly objective RDF method considers the weather states as living beings. It applies to them the dichotomic or dilemmatic keys, whose use is very frequent and successful in plant and animal taxonomy from almost two centuries ago. The dichotomic or dilemmatic keys are applied to the air pressure, reduced at the sea level, in a baric circuit oversensible to the weather changes. In Argentine, this circuit is covering 8 localities. What the key takes into account, when the forecast is being drawn up, is the situation of air pressure in the circuit and through the punched cards, its variation during the previous 72 hours. The forecast for areas of rain to be precipitated in Argentine, in the next 48 hours is on a simple way formulated, in 10 minutes about, with a file-archive of punched cards support. In the test of reliability carried out on Jan. 1958 between the common forecast method (synoptic analysis), applied by the National Meteorological Service, and the nearly objective RDF method, the latter became unquestionably superior to the former. The most significative difference was that, in average, it left a 3.53 times smaller area of rain precipitated with no forecast. The RDF method in the comparison above used a file-archive of 9131 punched cards, corresponding to the Weather Chart at 9 hours, from the 25 past years. The file-archive may be prepared by a working team of 2 experts, at the rate of 1 year of Weather Chart per week. According to the theory, forecasts shall yet improve if working with a more extensive file-archive. *Subject Headings:* **1. Precipitation forecasting 2. RDF method of forecasting 3. Objective forecasting.** —*Authors' abstract.*

12.3–252 551.509.33:551.515.2:551.509.317(265)

Neyama, Y., **The long-range forecast of typhoon by upper air data at Marcus Island.** *Journal of Meteorological Research*, Tokyo, 11(4):247–261, April **1959.** 14 figs., 4 tables, 17 refs. In Japanese; English summary p. 247. **DWB, DLC**—In this report, the author examined the possibility of the long-range forecast of typhoon by upper air data at Marcus Island, and obtained the results as follows: (1) Typhoon frequently attacks or approaches Japan proper 22 days after the period when the deviation of daily air temp. from the previous day at 80 mb level over Marcus Island continued to be less than ±1°C. (2) The deviation of typhoon track from the normal for each month depends upon the type of interdiurnal variation of temp. at the tropopause over Marcus Island during the period of 20 to 30 days prior to the attack or approach of typhoon to Japan proper. (3) When warm ridge was found at the tropopause over Marcus Island 22 days prior to the attack of typhoon to Japan proper, the rainfall due to typhoon amounts to about 500∼700 mm somewhere in West Japan, while only about 100∼200 mm at most in case of cold ridge. *Subject Headings:* **1. Long range typhoon forecasting 2. Typhoon forecasting 3. Japan.**—*Author's summary.*

12.3–253 551.509.334

Reuter, H., **Erfahrungen mit einer neuen Methode der Mittelfristprognose.** [Experiments with a new method of extended forecasting.] *Zeitschrift für Meteorologie*, Berlin, 11(10/11):299–305, Oct./Nov. **1957.** 4 figs., 6 refs., 5 eqs. **DWB, DLC**—The extended forecasting method developed by NAMIAS for extended forecasting is reviewed critically and Namias' regression equation for calculating a mean map from five values (12 hour intervals) is modified in order to improve its forecast accuracy and to extend the forecast period. The new method combines purely synoptic and statistical methods and involves the expressions

$$h_{0p}+h_{1a}+h_{1p}=5\bar{h}_{0a}-h_{0a}-h_{-1p}$$

for calculating the mean map for a 24 hour period and

$$h_{0p}+h_{1a}+h_{1p}+h_{2p}+h_{3a}+h_{3p}=5h_{0a}+2V+2N-h_{0a}-h_{1p}$$

for calculating the values between a 24 and 72 hour forecast period. In the practical listing of these two formulas the 24 and 72 hour means were computed, in addition the mean change with respect to transpired values was computed by means of the expression

$$(2V+2N)-(h_{-1p}+h_{-1a}+h_{-p2}+h_{-2a}$$

whereby $h_{0a}$ = the last available value on the zero day (forecast day). The latter expression was correlated with an actually occurring change extending beyond the 72 four forecast, namely with

$$(h_{3a}+h_{3p}+h_{2a}+h_{4p})-(h_{-1p}+h_{-1a}+h_{-2p}+h_{-2a})$$

The results of a series of forecast maps are shown and rather accurate forecasts are indicated. The correlations for 10 points of the forecast field over $r=0.86$ (24 hour forecast) $r=0.77$ (for the 24–72 hour period) and 0.70 for the mean change. *Subject Headings:* **1. Extended forecasting by statistical methods 2. Statistical forecasting.**—*I.L.D.*

12.3–254 551.509.5:551.578.45(73)

§Fulks, Joe Robert (*U.S.W.B.-Washington, D. C.*), **Study of the snowstorm of Nov. 6–7, 1953 as a forecast problem, Wash., D. C., U. S. Weather Bureau, 1954.** 40 p. 36 charts. Title on letter of transmittal, **Report of investigation of forecasting for the snowstorm of Nov. 6–7, 1953. DWB**—The cyclone which brought up to 28″ of snow to an area from New York to Buffalo and Harrisburg, Pa., and some snow to Washington and Baltimore, was almost completely unforecast as far as the precipitation, high winds and high water were concerned which caused damage throughout the Middle Atlantic Coast. Fully analyzed surface, 850, 700, 500, 300 and 200 mb synoptic charts for North America, for 12 hourly intervals from Nov. 5 through Nov. 7, 1953 are presented and discussed in this thorough post-analysis of the deep rapidly moving storm which formed just off the Gulf Coast on the front of a deep, cold anticyclone. The factor leading to poor forecasts was the movement after the center passed East Central Virginia, to the NW (Lake Ontario) instead of to the NE over Rhode Island (as predicted). No good method of anticipating this movement is suggested, though several systems (SUTCLIFFE'S SCHERHAG'S and J. J. GEORGE'S) were examined. The latter method seems to come the nearest to predicting the final northwesterly movement. If the precipitation area had been correctly forecast, the snow would have been forecast correctly too. Numerical prediction was not carried far enough to be certain of giving the final answer correctly. A great deal of discussion of advection of vorticity and of warm and cold air is included. Orographic influences are considered important. Analogs could not be found as the storm was unique. *Subject Headings:* **1. Snowstorm, Eastern United States Nov. 6–7, 1953 2. Cyclogenesis 3. Forecast post-analyses 4. Snowstorms 5. Middle Atlantic States.**—*M.R.*

12.3–255 551.509.5:519.28

Gleeson, Thomas A., **Prediction and decision method for applied meteorology and climatology, based partly on the theory of games.** *Journal of Meteorology*, Boston, 17(2):116–121, April **1960.** 7 tables, 12 refs., 8 eqs. **DWB, DLC.** Also issued as Florida. State Univ. Dept. of Meteorology, Contract AF 19(604)-4986, Scientific Report, No. 1, June 1, **1959.** 31 p. fig., 15 tables, 12 refs., 13 eqs. **DWB**—With the aid of examples, a prediction and decision method is described for use in applied meteorology or climatology where economic consequences have been evaluated beforehand. The predictand, which may be a single variable or several variables in combination, is divided into a finite number of forecast classes. Confidence limits of the relative frequency of each predictand class are necessary. The mathematical theory of games of strategy is utilized, but elementary algebra suffices for all required computations. The method gives decisions and predictand frequency distributions that tend to minimize expenses (or maximize minimum gains) in ventures affected by weather or climate regardless of how uncertain either of the latter may be. *Subject Headings:* **1. Forecast evaluation 2. Probability theory 3. Applied meteorology.**—*Author's abstract.*

12.3–256 551.509.5:551.515.4:551.551

Hannay, A. K., (*Bureau of Meteorology, Melbourne*), **Use of Showalter's Stability Index in thunderstorm forecasting.** *Australian Meteorological Magazine*, Melbourne, No. 13:40–45, June **1956.** fig., 2 tables, ref. **DWB**—Showalter's stability index is described and its use in Australia for alerting the analyst or forecaster to the possibility of thunderstorms in the area illustrated by a number of examples. The experience at Williamstown, N.S.W. in Dec. 1955, at Laverton, Victoria in Jan. 1956 and at Woomera, S. Australia in Feb. 1956 shows that any stability index of $<5.0$ is apt to be associated with thunderstorms within a 50 mi radius. Only one situation with an index $>5.0$ was associated with fairly widespread activity. Indexes (0500 and 1400) at Williamstown are tabulated for each day from 30 Nov. to 30 Dec. 1955, with notations as to thunder-storm observed, or widespread activity, respectively. *Subject Headings:* **1. Thunderstorm forecasting 2. Showalter's Stability Index 3. Australia.**—*M.R.*

12.3–257 551.509.68:632.187:551.515.41

Dessens, Henri, **Orages sur un foyer convectif artificiel.** [Thunderstorms in an artificial convective center.] *Puy de Dôme. Observatoire, Bulletin*, No. 1:27–30, Jan./March **1960.** fig., 6 refs. **DWB**—In the course of a journey made by road from Leverville to Leopoldville (Belgian Congo), the author observed two thunderstorms caused by bush fires in the regions particularly favorable to a strong instability of air through solar radiation. The author gives a short description of bush fires, relates his observations to the evolution of cumulus clouds and thunderstorms due to bush fires. The two areas of overheating to which one might attribute the formation of storms had surfaces in the order of a thousand hectares. The effect of the strongly marked contrast with the green vegetation in the Kwango valley added a favorable factor to the localization of convection. The analysis of these observations seems to prove that the combustion center, even relatively small, plays a determining role. On the contrary the relative solar overheating must act on a large area and cannot by itself impose a precise localization of showers. *Subject Headings:* **1. Thunderstorm dynamics 2. Effects of bush fires on thunderstorm formation 3. Kwango, Belgian Congo.**—*A.V.*

### WEATHER CONTROL (551.509.6)

*See:* **Cloud seeding, India** (Satakopan, Sen), **12.3–393.**

## STRUCTURE AND PHYSICS OF THE ATMOSPHERE

### ATMOSPHERIC COMPOSITION (511.510.4)

*See also:* **Chloride in the air** (West, Coll), 12.3–222.

12.3–258 550.4:551.510.41:546.226:546.132

Eriksson, Erik (*Inst. of Met., Univ. of Stockholm*), **On the geochemistry of chloride and sulfate.** *American Geophysical Union, Geophysical Monograph*, No. 3:124–127, **1959.** fig., table, 10 refs. **DWB, DLC**—A paper discussing the presence of chlorine and sulfur in the atmosphere on a global scale. The presence and amount of chlorine and sulfur in sea water and in sedimentary rocks is considered. The rate of weathering of igneous rocks and its calculation by examining the river-water composition, are taken into consideration. Two other sources are considered. One is the production of means of chlorine and sulfur, either by release into the atmosphere or release to rivers. The other is cycloic chlorine and sulfur, originating in the sea but transferred to land surfaces either by the atmosphere or by other processes. The paper also tabulates the geochemical balance of CL and S and includes a graphical representation of circulation of sea salts. *Subject Headings:* **1. Atmospheric chemistry 2. Chlorine in the atmosphere 3. Sulfur in the atmosphere 4. Geochemical balance of chlorine and sulfur 5. Circulation of sea salts.**—*I.S.*

12.3–259 551.510.41:546.214

Larsen, Sören H. H. (*Auroral Obs., Tromsö*), **Measurements of atmospheric ozone at Spitzbergen (78°N) and Tromsö (70°N) during the winter season.** *Geofysiske Publikasjoner,* Oslo, 21(5), Sept. **1959.** 8 p. 3 figs., 2 tables, 8 refs. **DWB, DLC**—In this paper, new results of measurement of total amount of atmospheric ozone at high latitudes (70°N and 78°N) are presented. These results, based on moonlight observations during an observing period of 8 years, do not support the suggestion of GÖTZ that an "ozone gap" should exist in December at high latitudes, or even the often quoted minimum at this time of the year. A secondary rise in the annual period seems to appear during November. This may support the conventional view that differential solar heating of the ozone layer initiates a stratospheric jet stream in the Arctic. *Subject Headings:* **1. Atmospheric ozone 2. Atmospheric chemistry 3. Ozone measurements 4. Stratospheric jet stream 5. Arctic.**—*Author's abstract.*

12.3–260 551.510.41:551.584.42:546.264

Monteith, J. L. and Szeica, G. (*both, Rothamsted Exp. Station, Harpenden*), **The carbon-dioxide flux over a field of sugar beet.** *Royal Meteorological Society, Quarterly Journal,* 86(368):205–214, April **1960.** 4 figs., table, 16 refs., 9 eqs. **DWB, DLC**—The difference of $CO_2$ concentration at two heights above a sugar beet crop was measured with a sensitive infra-red gas analyzer. The ratio of evaporation to humidity gradient and of total heat flux to wet-bulb temperature gradient gave a transport number for calculating $CO_2$ flux, assumed proportional to $CO_2$ gradient and wind speed. In Aug. and Sept. 1958 there was often a constant upward flux at night (mean 0.05 mg $cm^{-2}$ $hr^{-1}$) attributed to respiration by plants and soil micro-organisms; but during daylight, photosynthesis gave a downward flux varying with solar radiation and reaching a maximum of 0.4 mg $cm^{-2}$ $hr^{-1}$. From 31 July to 11 Sept. the next downward flux of atmospheric $CO_2$ was $158 \pm 29$ mg $cm^{-2}$ compared with an uptake of $217 \pm 38$ mg $cm^{-2}$ estimated from dry matter increase of sampled plants. During Oct. there was a net upward flux of 4.9 mg $cm^{-2}$ $day^{-1}$ attributed to a striking increase in amount of $CO_2$ produced in the soil. *Subject Headings:* **1. Carbon dioxide flux 2. Atmospheric chemistry.** —*Authors' summary.*

## ATMOSPHERIC POLLUTION (551.510.42)

*See also:* **Air pollution control** (Faith), 12.3–5; **Cosmic dust accretion** (Pettersson), 12.3–78; **Wind as a factor in atmos. pollution** (Hewson, Baynton), 12.3–88.

12.3–261 551.510.42:546.224

*†Bienstock, D.; Field, J. H. and Benson, H. E. (*all, Bureau of Mines, U. S. Dept. Interior, Bruceton, Pa.*), **Sulfur dioxide in atmospheric pollution and methods of control.** *American Geophysical Union, Geophysical Monograph,* No. 3:54–62, **1959.** fig., 5 tables, 27 refs. **DWB, DLC**—The paper first estimates and tabulates the present and anticipated future quantities of sulfur dioxide discharged to the atmosphere based on published data on present and estimated future fuels consumption and sulfur concentrations of these fuels. Later possible methods of reducing sulfur dioxide pollution are considered. Processes that have been used successfully for removing sulfur dioxide from process gases of smelters generally cannot be used for the purification of these gases because the sulfur dioxide content of the latter is too low. The paper discusses briefly some of the important factors to be considered in dealing specifically with sulfur dioxide produced in the combustion of fuels. The discussion on this paper is also reported. *Subject Headings:* **1. Atmospheric pollution 2. Sulfur dioxide in the atmosphere 3. Atmospheric chemistry.**—*I.S.*

12.3–262 551.510.42

Tsanko, G. E. and Serebriannaia, A. I., **Opyt opredeleniia zapylennosti vozdukha Kieva.** [Experiment for the determination of dust in the air in Kiev.] *Gigiena i Sanitariia,* Moscow, 24(2):74–75, Feb. **1959.** 2 tables. **DLC**—Results of 487 weight and 977 quantitative tests of dust content determination in the air carried out since 1956 by the Kiev City Sanitation Laboratory in 3 areas of the city showed that air pollution is much greater in the Union Station area than it is in a residential area and particularly in the Pioneer Park near the Dnieper River. It was found that in 33% of the samples of air in the Union Station area the dust content exceeded the maximum permissible norm of 0.5 mg/$m^3$. *Subject Headings:* **1. Dust measurements 2. Kiev, Ukrainian S.S.R.**—*A.M.P.*

## TROPOSPHERE—TROPOPAUSE (551.510.52)

*See also:* **Aviation med.,** 12.3–2; **Tropopause forecasting** (Sorenson), 12.3–44; **Trop. radio wave propagation** (Bugnolo), 12.3–99; **Transhorizon propagation** (Bolgiano), 12.3–100; **Trop. radio wave propagation** (Carr), 12.3–102; **Turbulent transfer in lower atmos.** (Swinbank), 12.3–280.

12.3–263 551.510.52:551.557.31:551.547.31:551.524.731

†Harris, Miles F. (*U. S. W. B., Wash., D. C.*), **Diurnal and semidiurnal variations of wind, pressure, and temperature in the troposphere at Washington, D. C.** *Journal of Geophysical Research,* Wash., D. C., 64(8):983–995, Aug. **1959.** 13 figs., 5 tables, 21 refs., 11 eqs. DLC—The diurnal and semidiurnal variations of wind, pressure, and temperature in the troposphere are obtained for a summer season by combining two series of 6-hourly observations made at different times at Washington, D. C. Order-of-magnitude estimates of terms in the equation of motion at the 5-km level suggest that a linearized form of the equation of motion describes the diurnal motions closely. On the assumptions that the pressure wave moves westward at an even rate without change of amplitude and that friction is absent, the local pressure variation is computed from the wind observations. At levels above 4 km in the case of the diurnal wave and above 1 km in the case of the semidiurnal wave, the phase computed from the wind agrees reasonably well with the observed phase of the pressure variation, although the calculated amplitude is too large. Discrepancies between the pressure changes determined from the wind and the observed pressure variation can be traced to the basic assumption of a simple progressive wave, to obvious wind errors that are revealed by an absence of vertical continuity, and probably to the vertical exchange of momentum in the layer near the earth's surface. *Subject Headings:* **1. Tropospheric conditions 2. Washington, D. C.**—*Author's abstract.*

12.3–264 551.510.528(436.14)

*Steinhauser, F. (*Vienna* 19, *Hohe Warte* 38), **Statistische Untersuchung der Tropopause über Wien, 1. Mitteilung.** [Statistical investigations of the tropopause over Vienna, Pt. 1.] *Zeitschrift für Meteorologie,* Berlin, 12(4/6):111–129, April/June **1958.** 5 figs., 9 tables. 3 refs. **DWB, DLC**—The monthly and annual means of the altitude and temperature of the lower tropopause were determined on the basis of 5 years of radiosonde ascents over Vienna at 3 and 15h GMT. The relationship between height and temperature of the tropopause is presented in the form of frequency distribution correlation coefficients and regression equations for the individual seasons. The interdiurnal variations of the height and temperature of the tropopause and their mutual relationships were investigated; frequency distributions were established for every month; mean values between the interdiurnal variations of height and temperature of the tropopause were computed and the correlations for individual months and seasons are presented in a correlation table. Regression equations for the relationships between interdiurnal temperature and height variations of the tropopause for individual seasons were derived. On the average, the tropopause temperature decreases by 0.3°C for a 100 meter increase in elevation of the tropopause and increases by 0.3°C for a 100 meter fall in elevation. The interdiurnal variations in height of the tropopause are not actually lowering and rising of an air mass but changes resulting from advective processes. This explains the fact that the temperature gradients are smaller than the adiabatic gradient. *Subject Headings:* **1. Tropopause height-temperature correlations 2. Vienna, Austria.**—*Transl. of author's summary and I.L.D.*

## STRATOSPHERE (551.510.53)

*See also:* **High relative humidity in lower stratosphere** (Hesstvedt), 12.3–366.

12.3–265 551.510.53:551.513:551.557.2(98)

†Hare, F. Kenneth (*McGill Univ., Montreal*), **The summer circulation of the Arctic stratosphere below 30 km.** *Royal Meteorological Society, Quarterly Journal,* 86(368):127–143, April **1960.** 13 figs., 2 tables, 27 refs. **DWB, DLC**—The summer circulation of the Arctic stratosphere is examined in the light of climatological data and daily synoptic analysis. The Ferrel

westerlies are shown to extend to about 20 km (50 mb) immediately above the jet axis. The middle stratospheric easterlies above them descend to 15 km at the pole in midsummer. The easterlies flow round the flanks of a flat-centered anticyclone near the pole, and are almost devoid of perturbations. The lower stratosphere (tropopause to 20 km) has a disturbed thermal regime due to vertical motion associated with waves in the Ferrel westerlies or with cold lows within the westerly ring. *Subject Headings:* **1. Arctic stratosphere 2. Circulation of Arctic stratosphere 3. Arctic.**—*Author's summary.*

12.3–266 551.510.534:551.521.17

*Larsen, Sören H. H. (*Auroral Obs., Troms*), **On the scattering of ultraviolet solar radiation in the atmosphere with the ozone absorption considered.** *Geofysiske Publikasjoner,* Oslo, 21(4), Oct. **1959.** 44 p. 15 figs., 11 tables, 9 refs., numerous eqs. **DWB, DLC**—In this paper an attempt has been made to give observational evidence of the existence of multiple molecular scattering and nonmolecular scattering of light in the ultraviolet region where the ozone absorption is very strong. An approximate method for calculating secondary scattered light considering ozone absorption has been developed and used for analysing the observed data. Information about the effects of multiple molecular and non molecular scattering processes has been obtained which should be taken into account when the vertical distribution of the ozone in the atmosphere is deduced by the "Umkehr Methods." *Subject Headings:* **1. Ultraviolet radiation scattering 2. Ozone absorption 3. Scattering of light 4. Umkehr methods.** —*Author's abstract.*

## IONOSPHERE (551.510.535)

*See:* **Sec. D1,** p. 458.

## RADIO METEOROLOGY (551.510.62)

*See:* **Sec. B8,** p. 452; **Trade wind inversion as an oceanic duct** (Katzin et al.), 12.3–349.

## RADIOACTIVITY (551.510.72)

*See also:* Sec. B5 . . .; **Radioactive rain** (Bleichrodt et al.), 12.3–402; **Radioactive rain** (Solodikhina), 12.3–403.

12.3–267 551.510.721:551.511.6:551.556.4:539(428)

Chamberlain, A. C. (*Atomic Energy Res. Establishment, Harwell*), **Deposition of iodine-131 in Northern England in Oct. 1957.** *Royal Meteorological Society, Quarterly Journal,* 85(366): 350–361, Oct. **1959.** 6 figs., 3 tables, 18 refs., 16 eqs. **DWB, DLC**—Iodine-131 and other radio-elements were emitted from the stack of the Pile No. 1 at Windscale, Cumberland, during the night of 10–11 Oct. 1957. The detailed distribution of the activity deposited on the ground was determined as far south as Preston and Leeds. The deposition of the radio-iodine is diffusion to the grass, but washout by rain and precipitation from some nearby cooling towers may have increased the rate of fallout in some areas. *Subject Headings:* **1. Radioactive fallout dispersal 2. Windscale accident 3. Radioactive iodine 4. Northern England.** —*Author's abstract.*

12.3–268 551.510.721:551.511.6:551.556.4:539(428)

Crabtree, J. (*Met. Office, Air Ministry, London*), **The travel and diffusion of the radioactive material emitted during the Windscale accident.** *Royal Meteorological Society, Quarterly Journal,* 85(366):362–370, Oct. **1959.** 8 figs., 2 refs. **DWB, DLC**—The reactor accident at Windscale on 10–11 Oct. 1957 resulted in the release of radioactive fission products into the atmosphere over a period of several hours. Measurements were made of the fission products, particularly iodine-131, collected on filters exposed for the study of atmospheric pollution in many places in the United Kingdom and Europe: measurements were also made of the iodine-131 deposited on grass. These showed that the effluent had been widely dispersed, but that activities over England were about an order of magnitude greater then those found over the neighbouring areas of the continent. Meteorological trajectory analysis showed that the main portion of the cloud had remained over England until 15 Oct., and that the activities over continental Europe were due to the eastern edge of the cloud. Meteorological data were used together with the air concentration data to deduce that about 22,000 curies of iodine-131 were present in the cloud as it passed over south Lanchashire and Yorkshire. *Subject Headings:* **1. Windscale accident 2. Radioactive fallout dispersal 3. Radioactive iodine 4. Northern England.**—*Author's abstract.*

12.3–269 551.510.721

Eisenbud, Merril and Harley, John H. (*both, Health and Safety Lab., N. Y. Operations Off., U. S. Atomic Energy Commission*), **Long-term fallout: a summary of measurements made through June 1957 by the gummed-film network of the AEC.** *Science*, Wash., D. C., 128(3321): 399–402, Aug. 22, **1958.** fig., 2 tables, 4 refs. **DLC**—Measurements (conducted through June 1957) by the gummed-film network of the AEC to estimate deposition of strontium-90 and external gamma dose are tabulated for the continental U. S. and other stations, and mapped for the worldwide network. Comparison of the result with open pot sampling of rainfall was made. This shows a mean ration of 1.45, a minimum of 1.66 at Salt Lake City. The U. S. disposition, which is 11 to 54 millicuries per sq mi, is higher than at other land areas of the world. *Subject Headings:* **1. Radioactive fallout measurements 2. Strontium 90 fallout 3. Radioactive fallout gummed-film networks 4. United States.**—*W.N.*

12.3–270 778.53:551.510.721

†Farlow, N. H. (*U. S. Naval Radiological Defense Lab., San Fran., Calif.*), **Applications of the chloride reagent film.** *American Geophysical Union, Geophysical Monograph*, No. 3:11–17, **1959.** 23 refs. **DWB, DLC**—The present paper gives a qualitative description of the formation and precipitation processes occurring in the nuclear cloud and the atmosphere beneath. It is based on the information obtained from applications of the chloride reagent film and a survey of the related literature. The reagent films, appropriately mounted in specialized instruments, were taken to the Eniwetok Proving Grounds and there used to collect the active fallout from a large-deep-water-type nuclear shot. The reagent film allowed the measurements of chloride and water content as well as a very crude estimate of the minor insoluble solids. These measurements yielded sufficient information to define the physical state, particle size and density of the slurry fallout particles. The general discussion that followed, is also reported in this paper. *Subject Headings:* **1. Fallout measurement techniques 2. Chloride reagent films 3. Eniwetok.**—*I.S.*

12.3–271 **551.510.721**:551.557

Stewart, N. G. and Crooks, R. N. (*both, Atomic Energy Research Establishment, Harwell*), **Long-range travel of the radioactive cloud from the accident at Windscale.** *Nature*, London, 182(4636):627–628, Sept. 6, **1958.** 3 figs., 2 tables, 4 refs., eq. **DWB**—The synoptic conditions in relation to the accidental releases of radioactivity from Windscale No. 1 Atomic Pile, Oct. 10 and 11, 1957 are given. Analysis of filter paper samplings as obtained along the track of the radioactive cloud is tabulated to show relative amounts of the main components obtained at Harwell 360 km in distance from Windscale, and the iodine-131 dosage in $\mu\mu$c-days/m$^3$ from 9 other European regions. Graphical presentation of the iodine-131 distribution on grass is shown on the leg 200 miles W and about 175 miles E of Oxford. The "deposition velocity" expressing the relation between any isotope in the air and its surface deposition is introduced along with results derived at geographically different locations. *Subject Headings:* **1. Windscale accident 2. Tracking of radio active cloud 3. Deposition velocity.**—*W.N.*

## MECHANICS AND THERMODYNAMICS OF THE ATMOSPHERE (551.511)

*See also:* **Hydrodynamics of oceans and atmos.** (Eckart), 12.3-6; **Vertical motion and weather,** 12.3-13; **Eddy flux** (Neumann et al.), 12.3-186; **Equations of motion** (Mintz), 12.3-189; **Thermodynamic diagrams** (Fett), 12.3-218; **Nonadiabatic heating** (Haltiner, Wang), 12.3-240; **Plane stationary currents** (Gandin, Alimova), 12.3-244; **Energy transformation in atmos.** (Kubota), 12.3-284; **Circulation effects on precip.** (Ponomarenko), 12.3-286; **Effect of Great Lakes on dynamics of atmos.** (Petterssen, Calabrese), 12.3-331; **Calculation of evaporation by simplified heat balance method** (Romanov), 12.3-368; **Determination of evaporation with heat balance method** (Struzer), 12.3-369; **Energy transport during radiation fog formation** (Kraus), 12.3-385; **Effect of adiabatic cooling on stratus and fog formation** (Pecquais), 12.3-386.

12.3–272 551.511:551.513

Barrett, Earl W. (*Dept. of Met., Univ. of Chicago*), **Eccentric circumpolar vortices in a barotropic atmosphere.** *Tellus*, Stockholm, 10(3):395–400, Aug. **1958.** table, 11 refs., eqs. **DLC**—An equation describing the behavior of an eccentric circumpolar vortex having an essentially zonal flow with respect to the pole of circulation (although apparently meridional with respect to the geographical pole), is developed and properties of the zonal harmonic eccentric vortices tabulated and discussed for number of wind maxima ($n$) = 1 to 5. The solution is obtained by transforming the coordinates to geographic coordinates. *Subject Headings:* **1. Eccentric circumpolar vortices 2. Zonal flow.**—*M.R.*

12.3–273 551.511:551.576.1

Scorer, R. S. (*Dept. of Math., Imperial College, London*), **Buoyant transfer in a stable environment.** *Advances in Geophysics*, N. Y., Vol. 6, pub. **1959.** p. 299–301. 2 refs. **DWB, DLC**—The horizontal length scales of motions transferring heat, momentum and pollution vertically in the upper troposphere are different on account of the intervention of clouds. *Subject Headings:* **1. Momentum transfer 2. Cloud effects on momentum transfer.** —*Author's abstract.*

12.3–274 551.511.1:551.509.312

Fultz, Dave and Kaylor, R. (*both, Univ. Chicago*), **The propagation of frequency in experimental baroclinic waves in a rotating annular ring.** (In: Bolin, Bert (*ed.*), **The atmosphere and the sea in motion.** N. Y., Rockefeller Institute Press, **1959.** p. 359–371. 11 figs., table, 23 refs., 20 eqs.) **DLC**—Measurements on the properties of certain types of simple group behavior exhibited by baroclinic waves in a rotating annular ring of fluid are described. They occur when a sloping base is used and exhibit definite evidence of effects of the depth variations equivalent to the influence of the $\beta$-parameter in simple Rossby waves. *Subject Headings:* **1. Baroclinic waves in a rotating fluid 2. Rotating fluid models.**—*Authors' abstract.*

12.3–275 551.511.13

*†Riehl, Herbert (*Univ. of Chicago*) and Malkus, Joanne S. (*Woods Hole Oceanog. Inst.*), **On the heat balance in the equatorial trough zone.** *Geophysica*, Helsinki, 6(3/4):503–538, **1958.** 20 figs., 5 tables, 30 refs., 11 eqs. **DWB, DLC**—The equatorial trough zone receives the latent heat accumulated by the lower trades, lifts and converts the energy, balancing radiation losses, and exports the residue poleward aloft in the form of sensible heat and potential energy. We construct an energy budget for the 10° latitude belt from the trough poleward, using a coordinate system relative to its position at seasonal extremes. We first calculate its total export requirement from recent radiation estimates of heat sources and sinks. A complete check from the earth-to-atmosphere supply of latent and sensible heat is not at present possible and the latter is calculated as residual, coming out a larger fraction of evaporation than previous estimates. Using the integrated balance, lateral export of enthalpy, potential energy and latent heat from the poleward boundary is computed as a function of height, using mean cross sections of the trough zone constructed from radiosondes, estimated precipitation, and a fitted mass circulation profile which is found to agree well with previous determinations. Finally, the required vertical flux of heat within the trough zone itself may be specified using the export and radiation requirements to fix its magnitude. Because of a

mid-tropospheric minimum of total energy (equivalent potential temperature), it is found that neither a gradual mass circulation nor simple convective-diffusion can transport heat upward to balance losses aloft and we postulate a mechanism of selective buoyancy, with undilute cloud towers in part compensated mass-wise by downdrafts. These are shown to be a plausible mechanism for the required added pick-up of heat from the sea and explain the high ratio of sensible to latent heat supply in this region. It is shown that a total of 1500-5000 active undilute cloud towers around the globe in the equatorial trough zone are adequate to balance its heat losses and provide for the export. *Subject Headings:* **1. Heat balance of equatorial trough zone 2. Latent heat release.**—*Authors' abstract.*

12.3–276 551.511.3:551.542:551.553(26)

Bijvoet, H. C., **On the relation between the pressure field and the surface wind at sea.** *Berlin. Freie Universität. Institut f. Meteorologie und Geophysik, Meteorologische Abhandlungen,* 9(1):19–25, **1960.** 5 figs., ref., 6 eqs. English summary p. 11. **DWB**—The author has derived an equation, based on the equations of HESSELBERG and SVERDRUP and on empirical data collected by BLEEKER and VERPLOEGH, which makes it possible to compute the surface wind at sea from a stationary or a nonstationary pressure field. A minor simplification of the equation makes it possible to construct a simple overlap for the determination of the surface wind over sea from the isobaric pattern. The overlay clearly shows: a) when the isobars are slightly curved the stability of the air is a factor that dominates over the curvature effect; b) when the isobars are strongly curved the stability can be neglected, as in such cases the curvature becomes the more important factor; c) only when the pressure tendency field is known very accurately it is justifiable to allow for the movement of pressure systems. *Subject Heading:* **1. Pressure-wind relationships at sea.**—*Author's abstract.*

12.3–277 551.511.3:551.511.6:551.558.2(262)

Fea, Giorgio, **Thermodynamical importance of synoptic analysis of motion fields in the Mediterranean area.** *Berlin. Freie Universität. Institut f. Meteorologie und Geophysik, Meteorologische Abhandlungen,* 9(1):95–104, **1960.** 6 figs., eqs. English summary p. 13. **DWB**—A few remarks are made regarding dynamic and thermodynamic phenomena in the Mediterranean. Special emphasis is placed on the advantages of a systematic synoptic analysis of the field of motion together with that of the related thermodynamic elements The results are discussed of a few preliminary experiments in which the following quantities were studied: relative vorticity, divergence, deformation, vertical component of the motion and frontogenetical factor. The relative vorticity charts show a good time-space continuity and are also consistent with the fields of pressure and of wind. Consistency allows us also to give the vergence patterns reasonable confidence, in spite of the fact that their interpretation is sometimes difficult and that the patterns do not always show good time continuity. The vertical component of the motion is obtained by graphical integration of the vergence distribution in successive isobaric layers, under the hypothesis of no mass divergence. In spite of the great number of graphical operations and the limiting assumptions, it is often possible to perceive good continuity. This confirms the confidence in the used technique. *Subject Headings:* **1. Synoptic analysis of motion fields 2. Frontogenesis 3. Mediterranean.**—*Author's abstract.*

12.3–278 551.511.6:551.551

†Corrsin, Stanley (*Johns Hopkins Univ., Baltimore*), **Outline of some topics in homogeneous turbulent flow.** *Journal of Geophysical Research,* Wash., D. C., 64(12):2134–2150, Dec. **1959.** 13 figs., bibliog p. 2149–2150, 56 eqs. **DLC**—Following general remarks on the homogeneous turbulence problem and an indication of kinematic and dynamic relations in the isotropic case, outlines are given of the phenomena of spectral transfer and tendencies toward isotropy. A discussion of Reynolds numbers is followed by detailed comparisons of some characteristic lengths. There are, finally, an outline of some theories on spectral turbulent energy transfer and a mention of static pressure fluctuations. *Subject Headings:* **1. Turbulent flow 2. Spectral transfer 3. Turbulent energy transfer theories.**—*Author's abstract.*

12.3–279 551.511.6:551.551.5

Stewart, R. W. (*Univ. of British Columbia, Vancouver, B. C.*), **The natural occurrence of turbulence.** *Journal of Geophysical Research*, Wash., D. C., 64(12):2112–2115, Dec. **1959.** 21 refs. **DLC**—In order to make the scientific meaning of the word 'turbulence' clear, it is proposed that a fluid be called turbulent if each component of the vorticity is distributed irregularly and aperiodically in time and space, if the flow is characterized by a transfer of energy from larger to smaller scales of motion, and if the mean separation of neighboring fluid particles tends to increase with time. Whether or not a flow is turbulent is not simply a matter of Reynolds number, since the stability of the flow is a criterion of at least equal importance. From the results of experimental work in recent years of a number of people (ANDERSON, FRENKIEL and KATZ, KELLOGG, LILLER and WHIPPLE, MALKUS) it seems reasonable to infer that with the exception of strong inversion layers the atmosphere may be assumed to be turbulent everywhere, although the intensity of the turbulence varies widely in both time and space. If the Kolmogorov similarity theory of locally isotropic turbulence is accepted, the most important parameter in the turbulent field is the energy dissipation. *Subject Headings:* **1. Turbulence occurrences 2. Atmospheric turbulence 3. Kolmogorov's similarity hypothesis.**—*Author's abstract.*

12.3–280 551.511.6:551.511.33:551.510.522

Swinbank, W. C. (*Div. of Met. Physics, C. S. I. R. O., Melbourne*), **Turbulent transfer in the lower atmosphere.** *UNESCO, Arid Zone Research*, 11:35–37, pub. **1958.** fig., 5 refs., 2 eqs. French summary p. 37. **DWB** (M84 US8cl)—An account is given of a program of measurement of the vertical transfer of heat (platinum resistance wire), humidity (two elements, one acting as dry and the other as wet-bulb thermometer) and momentum (hot wire anemometer) over level grassland near Melbourne. From the considerable amount of data now available, the author concludes that "at a height of 2 in. and in moderate winds, the instruments must be capable of recording fluctuations of a period of about one second." Coefficients for water vapor and momentum flux appear to be about equal, but the heat transfer coefficient is twice as high as the other two during moderate stability and the ratio increases with greater instability. Sample records are presented. *Subject Headings:* **1. Turbulent transfer 2. Heat transfer in the atmosphere 3. Melbourne, Australia.**—*G.T.*

## GENERAL CIRCULATION (551.513)

*See also:* **Sunspot effects of westerlies** (Arai), 12.3–111; **Solar-atmos. relationships** (Spar), 12.3–112; **Solar-atmos. relationships** (Girs), 12.3–113; **Solar-atmos. relationships** (Asakura), 12.3–114; **Ocean-atmos. interaction** (Neumann et al.), 12.3–186; **Circulation models** (Mintz), 12.3–189; **Circulation of Arctic stratosphere** (Hare), 12.3–265; **Circumpolar vortices in a barotropic atmos.** (Barrett), 12.3–272; **Zero layer-circulation relationships** (Faust), 12.3–360; **Bai-u circulation** (Sugaya, *comp.*), 12.3–399; **Local atmos. circulation** (Schüepp), 12.3–441.

12.3–281 551.513:551.557:551.510.535

Sprenger, K., **Ionosphärendriftmessungen im Langewellenbereich als Beitrag zum Problem der allgemeinen Zirkulation der Hochatmosphäre.** [Ionospheric drift measurements in the long wave region as a contribution to the problem of general circulation in the upper atmosphere.] *Zeitschrift für Meteorologie*, Berlin, 12(7):211–218, **1958.** 8 figs., 10 refs. English summary p. 211. **DWB, DLC**—Spaced receiver measurements on low frequency waves for the determination ionospheric drifts in the altitudes of 90 km indicate distinct seasonal reversals of the circulation of the upper atmosphere. Prevailing drifts Zx are directed towards ENE during summer and winter, but for distinct periods in spring and autumn there is a marked change to the nearly opposite direction. The mean drift velocity is about 70 m/s for both cases without any significant variation during the year. The normal drifts are superimposed by small diurnal variations, and an additional component from N towards S is observed during magnetic storms. *Subject Headings:* **1. Ionospheric drift measurements 2. Upper air circulation.**—*Author's abstract.*

12.3–282 551.513.1:551.515.71

Koppány, György, **Példa blocking-helyzet kialakulására az Atlanti-Európai térségben.** [Example of a development of blocking situation in the Atlantic-European region.] *Időjárás*, Budapest, 63(5):280–285, Sept./Oct. **1959.** 4 figs., 3 refs. Hungarian and German summaries p. 280. **DLC**—A case study concerning the forming of the blocking-situation in the Atlantic-European region. The forming of the East-Atlantic blocking-situation of Jan. 1957 is analysed. The author states that in the period previous to the forming of the blocking anticyclone very strong air waves passed towards the East, over the Atlantic Ocean near to the tropopause, between the latitudes of 40 and 60°N. These height level pressure-waves were accompanied by pressure-waves near the ground which were slowing down in front of the European coasts. The meeting of the upper and lower pressure rise brings about the development of a high (blocking) anticyclone. *Subject Headings:* **1. Blocking situations 2. Anticyclones 3. Atlantic-European region.**—*Author's abstract.*

12.3–283 551.513.1

†Koslowski, Gerhard, **Überlegungen zu einem Geschwindigkeitsdiagramm in der Atmosphäre.** [Considerations on a velocity diagram for the atmosphere.] *Berlin. Freie Univ. Institut für Meteorologie und Geophysik, Meteorologische Abhandlungen,* 6(2): **1958.** 32 p. 6 figs., 5 tables, 30 refs., eqs. **DWB**—This is a doctoral dissertation presented in 1957. A vertical cross section of the zonal geostrophic wind field (mean values July/Aug. 1949–1953) for the Northern Hemisphere is compared with Mironovitch's Sections along the 150 E meridian for both hemispheres and is also discussed with reference to several contributions by other workers. Author's results are generally in agreement with those of MIRONOVITCH, except in the author's presentation of a narrow west wind band close to the Equator in the lower atmosphere. In summer vorticity is less distinct, its maximum is about 20 m/sec at about 48°N. The investigation of the wind system includes calculated results, tabulated in detail, of the influence of the meridional air mass transport in relation to inertial equilibrium and friction of the atmosphere. From this the results of the relative momentum of the Northern Hemisphere are shown to be: $M_{\text{winter}} = 102.91 \cdot 10^{31}$ g cm$^2$ sec$^{-1}$; $M_{\text{summer}} = 4.27 \cdot 10^{31}$ g cm$^2$ sec$^{-1}$; $M_{\text{year}} = 107.18 \cdot 10^{31}$ g cm$^2$ sec$^{-1}$. *Subject Headings:* **1. General circulation models 2. Vertical cross sections.**—*W.N.*

12.3–284 551.513.1:551.511.13

Kubota, S. (*Met. Res. Inst., Tokyo*), **Numerical analysis of the energetical structure of the atmosphere over the Northern Hemisphere.** *Papers in Meteorology and Geophysics*, Tokyo, 10(1):1–33, Sept. **1959.** 25 figs., 8 tables, 15 refs., 42 eqs. **DWB**—In the present paper, the results of various numerical analyses carried out from the standpoint of energetics for 500 mb level and surface maps from Oct. 24 to Nov. 2, 1956, are reported. Namely, the spectral distributions of kinetic energy, momentum transfer and the behaviour of energy transformation between the available potential and kinetic energy or within each and further minute features of two domains of wave number and coefficient of friction etc., have been studied, using a modified two-layer model with the simplified *w*-equation. *Subject Headings:* **1. Energy transformation in the atmosphere 2. Northern Hemisphere.**—*Author's abstract.*

12.3–285 551.513.2:551.557.5:551.542.1

Vítek, Vojtěch (*Geophysical Inst., Czech. Academy of Science, Dept. of Short-Range Forecasting, Prague*), **On the problem of ageostrophic components in a jet stream.** *Studia Geophysica et Geodaetica*, Prague, 2(2):157–164, **1958.** 8 refs., 4 eqs. English summary p. 163. **DWB**—The author gives a partial explanation of the dynamics of ageostrophic components in a jet stream by analyzing the field of motion and recognizing the possibility of creating a flow toward higher pressure. Circumstances which favor the latter in such conditions are discussed. By means of equations he gives a basis of dynamic interpretation of some related phenomena. The method used in this paper can be used to explain some of the typical properties of a jet stream, particularly the connection between its intensity and the intensity of the flow toward higher pressure, as well as the compensation effects. *Subject Headings:* **1. Jet stream dynamics 2. Ageostrophic winds.**—*N.N.*

12.3–286 551.513.3:551.511.11:551.577.35(477,262.5)

Ponomarenko, I. N., **Vliianie chernomorskoĭ depressii na raspredelenie anomaliĭ atmosfernykh osadkov nad iuzhnymi raĭonami Evropeĭskoĭ chasti SSSR.** [Effects of the Black Sea Depression on the distribution of atmospheric precipitation anomalies above the southern regions of the European U.S.S.R.] *Kiev, Ukraine. Nauchno-Issledovatel'skiĭ Institut, Trudy*, No. 5:178–195, **1956.** 5 figs., table, 12 refs. **DWB, DLC**—The results of a study of the influence of the Black Sea low pressure area for the period 1945–1952 are presented and commented on. It is shown that an activation of the Black Sea depression during anticyclogenesis over S-E European U.S.S.R. is the main cause of frequent noncoincidence of the sign of precipitation anomalies over the Black Sea, southern Ukraine and the western regions of north Caucasus with the sign of precipitation anomalies over the remaining regions and the whole European U.S.S.R. *Subject Headings:* **1. Centers of action 2. Circulation effects on precipitation 3. Black Sea.**—*A.M.P.*

## ATMOSPHERIC DISTURBANCES (551.515)

*See also:* **Tornado data, U. S.** (Wolford), 12.3–11; **Anticyclones, Arctic** (Belmont), 12.3–26; **Tropical cyclone damage to sugar crops, Mauritius** (Swan), 12.3–61; **Fire whirlwinds** (Whittingham), 12.3–86; **Sunspot effects on westerlies** (Arai), 12.3–111; **Ionos. response to passage of hurricanes** (Mook), 12.3–124; **Thunderstorm—sporadic E ionization relationships** (Rastogi), 12.3–125; **Thunderstorms, Lithuania and Kaliningrad** (Raliene, Tylieni), 12.3–230; **Long range typhoon forecasting** (Neyama), 12.3–252; **Thunderstorm forecasting** (Hannay), 12.3–256; **Thunderstorm dynamics** (Dessens), 12.3–257; **Blocking situation** (Koppány), 12.3–282; **Effect of Great Lakes on atmos. disturbances** (Petterssen, Calabrese), 12.3–331; **Cyclone effects on deformation of terrestrial crust** (Jobert), 12.3–332; **Storms** (Kron), 12.3–348; **Atmos. disturbances, Canary Islands** (Font), 12.3–445.

12.3–287 551.515.23:778.35

Bundgaard, Robert C. (*U. S. A. F., Hqs., 10th Weather Group*), **The first flyover of a tropical cyclone.** *Weatherwise*, Boston, 11(3):79–83, June **1958.** 3 figs., **DWB**—A large (39 mile diameter cloudscape) mosaic of aerial photographs taken from above Typhoon "Kit" on Nov. 14, 1957 at 19°30′N and 125°35′E, just NNE of the Philippines, shows a number of spirals within the general spiral circulation area of the typhoon. Breaks in the cloud undercrest show glimpses of the sea surface. A streamline chart of the same scale shows derived air trajectories in the area. The history of the storm, which at one time had 200 mph winds at sea and 100 mph winds at San Vicente on Quezon on Nov. 11, and with maximum rainfall of 16.66 in. at Baler, Quezon on Nov. 12. *Subject Headings:* **1. Aerial photography of typhoons 2. Typhoon "Kit" (1957) 3. Quezon, Philippines.**—*M.R.*

12.3–288 551.515.23:551.526.6

Fisher, Edwin L. (*New York Univ.*), **Hurricanes and the sea-surface temperature field.** *Journal of Meteorology*, Boston, 15(3):328–333, June **1958.** 8 figs., table, 7 refs. **DWB, DLC**—The behavior of hurricane tracks and the variations of the intensity of hurricanes are investigated in a study of the sea-surface temperatures around eleven hurricanes. By the use of several methods of analysis, it is found that there is distinct, although not conclusive, evidence that hurricanes tend to form near relatively warm ocean areas, that they tend to follow tracks along the areas of warmest water, and that they tend to weaken when they move over pronouncedly colder water. (For abstract from another source, *see* 9.2–197, Feb. 1958, *Met. Abstracts.*) *Subject Headings:* **1. Hurricane track-sea temperature relationships 2. Sea surface temperature effects on hurricanes.**—*Author's abstract.*

12.3–289 551.515.23(263)

Haggard, William H., **Hurricane frequencies.** *Mariners Weather Log*, Wash., D. C., 1(1):2–4, Jan. **1957.** 3 figs. **DWB**—A graph shows annual frequencies of North Atlantic hurricanes from 1879–1956. The number decreased from 1887–1929, then increased and remained at a higher level for the next 25 years. Tracks on today's charts are essentially the same as those on Redfield's chart, published in 1835. A large time graph shows the days or periods on which tropical storms occurred in the Atlantic and Caribbean each year 1887–1955. It can be seen that hurricanes are very frequent from the 3rd decade of August to the 2nd decade of October. *Subject Headings:* **1. Hurricane frequencies 2. North Atlantic 3. Caribbean.**—*M.R.*

12.3–290 551.515.23:525.63(763)

Harris, D. Lee (*U. S. Weather Bureau, Wash., D. C.*), **Hurricane Audrey storm tide.** *U. S. Weather Bureau. National Hurricane Research Project Report* No. 23, Oct. **1958.** 19 p. 9 figs. (2 fold.) **DWB** (M15.2 U5845r) —The abundance of observational material available on the storm tide of hurricane "Audrey" before and after crossing the shore near the Texas-Louisiana border on June 27, 1957 was analyzed. Storm tide recordings from some 30 stations are plotted on a map including the hour-by-hour path of "Audrey." The storm tide elevations at more than 100 locations are mapped along with the topographical features of the region. The graphical data include predicted tides, variation in daily sea level for May–July 1957, observed and predicted monthly mean of the sea level, computed storm surge, and the original tide gage recordings. The suggestions for the improved warning systems and the recommendations given on constructional and instrumental aspects compensate for the lack of answers to the problem of storm tides. *Subject Headings:* **1. Hurricane "Audrey" (1957) 2. Storm tides 3. Louisiana.**—*W.N.*

12.3–291 551.515.23(74–75)

§Hoover, Robert A. (*U. S. W. B., Wash., D. C.*), **The Middle Atlantic Coast hurricane of October 22–24, 1878.** *Weatherwise*, Boston, 10(4):126–127, Aug. **1957.** fig. **DWB**—Case history with synoptic chart for Eastern U. S. and track of hurricane that passed directly over Washington, D. C. on Oct. 23, 1878 (barometer 975 mb). In Philadelphia 700 substantial buildings (churches, schools, factories, warehouses, hotels, etc.) were destroyed and two bridges over the Delaware River fell due to flood waters. Eight vessels sank and 22 were damaged in port. In New England 23 schooners were wrecked on the Massachusetts coast. Many lives were lost at sea. *Subject Headings*: **1. Hurricane, Middle Atlantic Coast (1878) 2. Hurricane damage.**—*M.R.*

12.3–292 551.515.23

Matano, H. (*Met. Research Inst., Kyoto Univ., Japan*), **A statistical study of the formation of severe typhoon over the tropical ocean.** *Meteorological Society of Japan, Tokyo, Journal*, Ser. 2, 35(4):249–253, Aug. **1957.** 5 figs., 3 tables, 5 refs. **DWB, DLC**—The following subjects are statistically studied to give the indirect evidences which sustain Namekawa's theory of main and secondary typhoons: frequency distribution of the minimum central pressure, areal distribution of the formation of severe typhoon, relative position of the centers of main and secondary typhoons, and dimension of the inner core of main typhoon. *Subject Heading:* **1. Typhoon formation.**—*Author's abstract.*

12.3–293 551.515.21

§Richter, D. A. and DiLoreto, E. A. (*both, National Weather Analysis Center, U. S. W. B., Wash., D. C.*), **The transformation of hurricane Flossy into an extratropical cyclone, Sept. 25–29, 1956.** *Monthly Weather Review*, Wash. D. C., 84(9):345–352, Sept. 1956. 14 figs., 14 refs. **DWB, DLC**—Details on origin, blocking, recurvature and structure of hurricane "Flossy" of 1956, illustrated by ample synoptic and upper air data charts, etc. *Subject Headings:* **1. Hurricane genesis 2. Hurricane "Flossy" (1956).**—*M.R.*

12.3–294 551.509.318:551.515.23(763)

*§Ross, Robert B. and Blum, Maurice D. (*both, Natl. Wea. Analysis Cent., U. S. W. B., Wash., D. C.*), **Hurricane Audrey, 1957.** *Monthly Weather Review*, Wash., D. C., 85(6): 221–227, June **1957.** 7 figs., 7 refs. Also: Klein, William H. (*Extended Forecast Section, U. S. W. B., Wash., D. C.*), **The weather and circulation of June 1957: including an analysis of hurricane Audrey in relation to the mean circulation.** *Ibid.*, Wash., D. C., 85(6):208–220, June **1957.** 12 figs., 17 refs. **DWB, DLC**—A complete synoptic analysis of conditions attend-

ing hurricane "Audrey, June 25–28, 1957 (killing over 500 people and causing 150 to 200 million dollars damage) which demolished whole villages in the tidewater or bayou area of Louisiana. Heavy rains and high winds did considerable damage even into Ontario, and destructive tornadoes occurred in Alabama. The 500 mb, 200 mb and cross section charts show cause of deepening stratospheric warming, low tropopause, etc. June 1957 weather in the U. S. was notable for a continuation of the tornadoes, heavy rains and floods of the three preceding months. General circulation, jet stream and other features for the month are discussed, then a week-by-week summary of the synoptic conditions is presented, and finally details of conditions attending hurricane "Audrey" (which hit Louisiana on June 27) the worst June hurricane on record are presented in test and numerous charts. *Subject Headings:* **1. Hurricane "Audrey" (June 1957) 2 Synoptic analyses of hurricanes 3. Louisiana.**—*M.R.*

12.3–295 551.515.23

Spencer, K. E. and Page, R. C., **Hurricane "Carrie," North Atlantic Ocean.** *Marine Observer*, (London), 28(181):123–125, July **1958.** 6 photos. **DLC**—A record track for hurricane "Carrie" was observed to be 6,000 mi from off the African Coast to near Bermuda and back across the Atlantic to the British Isles. Other references are given for recorded facts on same hurricane "Carrie" as observed elsewhere. *Subject Headings:* **1. Hurricane "Carrie" (July 1958) 2. Hurricane tracks.**—*N.N.*

12.3–296 551.515.23(729)

Suarez Gomez, Mario (*Dir., Met. Station, Sancti Spiritus, Cuba*), **Memoria del huracán de Las Villas de 1952.** [Memoir on the Las Villas hurricane of 1952.] Sancti Spiritus, Las Villas, Cuba, Tipografia Venus, [1953?] 22 p. diagrs. **DWB**—The development and path of a hurricane is described with special reference to its passage over Cuba (Oct. 24, 1952), where it had become somewhat dissipated due to a high pressure center which invaded the Gulf of Mexico from the North American continent. Obstructed by this anticyclone, the hurricane was forced to follow the path of the least resistance which caused irregularities in its trajectory. The pattern of the cyclone, the author states, once again confirms the "repercussion theory" of MILLAS. Accompanying basic meteorological data are given. *Subject Headings:* **1. Hurricane tracks 2. West Indies.**—*G.T.*

# RADIATION AND TEMPERATURE

## RADIATION (551.521)

*See also:* **Darkness effects on long day plants** (Wellensiek), 12.3–64; **Temp. effects on cholera** (McGuire), 12.3–67; **Solar radiation anomalies** (Spar), 12.3–112; **Infrared radiation measurement** (Lachenaud), 12.3–233; **Ultraviolet radiation scattering** (Larsen), 12.3–266; **Radiation effects on ocean temp.** (Roden, Groves), 12.3–325; **Cloudiness effects on radiation** (Gal'perin, Kuchumova), 12.3–391; **Radiation measurements** (Schüepp), 12.3–441.

12.3–297 551.521.1:551.581(4)

*†Black, J. N. (*Univ. Adelaide*), **A contribution to the radiation climatology of Northern Europe.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, Vienna, 10(2): 182–192, **1960.** 2 figs., 2 tables, 51 refs. English, German and French summaries p. 182. **DWB, DLC**—Global radiation data were assembled for twenty-three northern European stations, in an area bounded approximately by latitudes 51° and 61°N, and longitudes 5° and 30°W. After reduction to a common period, the data were used for the construction of isopleths of global radiation, and monthly charts are presented. Two interesting features of these charts were firstly an area of "low" radiation over western Germany, and secondly an area of "high" radiation over southern Scandinavia. The charts of global radiation were used to assess the accuracy of three published world-wide estimates of global radiation, and it was shown that over the year, the charts of BUDYKO (1955) and BLACK (1956) were about 3% too high, and those of BERNHARDT and PHILIPPS (1958) about 10% too high, for this particular area, when com-

pared with the isopleths derived from actual data. *Subject Headings:* **1. Global radiation data 2. Global radiation distribution 3. Radiation climatalogy 4. Europe.**—*Author's summary.*

12.3–298 551.521.1:551.521.14

Jackson, C. Ian (*McGill Univ., Montreal*), **Estimates of total radiation and albedo in sub-Arctic Canada.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B.* Vienna, 10(2):193–199, **1960.** 3 tables, 5 refs., 3 eqs. English, German and French summaries p. 193. **DWB, DLC**—Maps have recently been prepared of the physiography and plant cover of Labrador-Ungava, in the Canadian Sub-Arctic. These enable detailed studies of representative localities to be extended over wider areas. Methods of estimating the average total insolation from sun and sky received at the surface are discussed, together with aerial measurements of albedo and thus a method of calculating the insolation absorbed by the surface is demonstrated. The limitations of the technique are stressed. *Subject Headings:* **1. Radiation measurement techniques 2. Insolation measurement techniques 3. Albedo measurement 4. Canadian sub-Arctic.**—*Author's summary.*

12.3–299 551.521.1(234.3)

*Thams, J. C. and Wierzejewski, H. (*Cent. Met. Svizzera, Locarno-Monti & Phys. Met. Obs., Davos*), **Messungen der Zirkumglobalstrahlung am Alpensüdfuss.** [Measurements of circumglobal radiation in the southern Alpine Piedmont.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, Vienna, 9(2):185–198, **1958.** 5 figs., 6 tables, 8 refs., 4 eqs. German, English and French summaries p. 185–186. **DWB, DLC**—The present paper deals with the measurements of circumglobal radiation, i.e., the total radiation incoming from sun, sky and ground reflection on a spherical pyranometer, which have been carried out for several years on the southern slope of the Alps. The investigation shows that there is a strict relation between the circumglobal radiation and the duration of sunshine on the one hand and the global radiation, falling either on a horizontal surface or a cube on the other. This relation can be used for the reduction from a short period of observations to a longer one, and it is possible to draw from measurements with a spherical pyranometer reliable conclusions on the radiation economy of a cube, e.g., a building. *Subject Headings:* **1. Global radiation 2. Circumglobal radiation—sunshine duration relationships 3. Alps.**—*Authors' summary.*

12.3–300 551.521.1:551.521.14(99)

Hoinkes, H. C. (*Univ. of Innsbruck*), **Studies of solar radiation and albedo in the Antarctic.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, Vienna, 10(2):175–181, **1960.** fig., table, 5 refs. English, German and French summaries p. 175. **DWB, DLC**—The preliminary report deals with studies of the direct solar radiation and albedo which were performed during the US-IGY-Antarctic Expedition 1957/58. The intensity of the direct solar radiation at Little America V (78°S, 162°W, 44 m above sea level) corresponds to the intensities measured in the European Alps at 3000 m in June. The intensity at the South Pole (2800 m above sea level) agrees with the intensity in the European Alps at 3000 m in December. Measurements of the albedo at the South Pole and at Byrd Station (80°S, 120°W, 1515 meters above sea level) gave a mean value of 89 percent, the whole range being 84 to 93 percent. *Subject Headings:* **1. Solar radiation 2. Albedo measurements 3. Byrd station, Antarctic.**—*Author's summary.*

12.3–301 551.521.14:551.578.46(99)

Hanson, Kirby J. (*Office of Met. Res., U. S. W. B., Wash., D. C.*), **Radiation measurement on the Antarctic snowfield: a preliminary report.** *Journal of Geophysical Research*, Wash., D. C., 65(3):935–946, March **1960.** 17 figs., 2 tables, 12 refs. **DLC**—Observations of solar and terrestrial radiation and associated energy exchange at the geographic South Pole were first taken during the IGY. An attempt is made to show the problems of radiation observation when standard instrumentation is used on a polar snowfield. Low sun elevation, temperatures 159°F below calibration, and human limitations during the winter night all affect in varying degree the observations of fluxes of solar and terrestrial radiation. A preliminary study of the radiant energy exchange is presented to show the absorption of solar radiation at the snow surface and the effect of "warm" clouds on surface temperatures during the winter night.

*Subject Headings:* **1. Radiation measurement on snowfields 3. Antarctica. 2. Radiant energy exchange.**—*Author's abstract.*

12.3–302 535.24:551.521.14:551.521.16(99)

*Hood, John M., Jr. (*U. S. Navy Electronics Lab., Calif.*), **Environmental photometry in the Antarctic.** *Journal of Geophysical Research*, Wash., D. C., 65(5):1527–1534, May **1960.** 8 figs., 5 tables, 7 refs., 3 eqs. **DLC**–A series of photometric measurements are presented which were made in November 1958 in transit to and in the McMurdo Sound area, Antarctica. Included are luminance distributions of clear and overcast skies, several measurements of air clarity, the diffuse/total illuminance ratio, and luminances of ice and sea surface details under a typical condition of weather and lighting. A photographic technique is described for measuring meteorological range or air clarity. A value of 73.9 nautical miles for a contrast transmittance of 0.02 on a clear, cloudless day was found. Applications of Fritz's theory to overcast sky data are discussed. *Subject Headings:* **1. Photometric data 2. Luminance distribution 3. Antarctica.**—*Author's abstract.*

12.3–303 551.521.16(68.01)

*Drumond, A. J. (*Eppley Lab. Newport, R. I.*), **Notes on the measurement of natural illumination, Pt. 2, Daylight and skylight at Pretoria: the luminous efficiency of daylight.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, Vienna 9(2):149–163, **1958.** 4 figs., 6 tables, 13 refs. English, German and French summaries p. 149–150. (For Pt. 1, *see* 8.2–80, Feb. 1957, *Met. Abs.*) **DWB, DLC**—In this paper is presented an analysis of the natural illumination data assembled at Pretoria (Union of South Africa) during 1955. The results are the first available for the Southern Hemisphere regarding the intensities of the total luminous flux, through a horizontal surface, and also of its component due to skylight. The basic instrumentation and the record standardization procedures have been discussed in a previous contribution. The main results are compared with those derived at Kew (England), Tashkent (U.S.S.R.), Vienna (Austria), and Washington (U. S.). Estimates of the luminous efficiency of daylight, defined as the ratio daylight intensity/radiation intensity, are provided for cloudless and overcast skies at Pretoria. Representative values are tabulated for seasonal variation of the luminous efficiency at those places where such information is available. *Subject Headings*: **1. Illumination data 2. Daylight lumination 3. Pretoria, Union of South Africa.** *Author's abstract.*

12.3–304 551.521.16

Hisdal, V. (*Norwegian Polar Inst., Oslo*) **On the relative spectral distribution of the radiation from the zenith sky.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, Vienna, 10(1):59–68, **1959.** 4 figs., 2 tables, 4 refs., eqs. English, German & French summaries p. 59. **DWB, DLC**—Spectral intensities of the scattered radiation from the zenith sky were measured using a filter monochromator. The monochromator was calibrated by means of a tungsten-filament lamp with known spectral energy distribution. The intensities of the individual wave-bands were referred to the total radiation intensity in the wave range considered, i.e. all spectral distributions were adjusted so as to give a constant total radiation. The relative intensity distributions obtained in this way are discussed. The results indicate that the relative intensity in a wave-band around 460 m is to a large extent independent of the atmospheric scattering conditions. *Subject Headings:* **1. Spectral radiation distribution 2. Zenith sky radiation 3. Monochromators.**—*Author's abstract.*

12.3–305 551.521.3:551.576.1

Bocharov, E. I., **Spektral'naia prozrachnost' oblakov.** [Spectral transparency of clouds.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 5:678–685, **1958.** 7 figs., 2 tables, 5 refs. **DLC.** Transl. into English in the corresponding number of the *Akademiia Nauk SSSR, Bulletin of the Academy of Sciences, USSR, Geophysics Series.* **DWB, DLC**—The spectral penetrability of clouds was investigated on the basis of a method for studying the microstructure of clouds developed during the Elbrus expeditions (*Akad. Nauk SSSR, Doklady*, 91(6), **1953**) whereby it is possible to compare the conclusion of the theory of scattering with experimental results and to measure the size of indices of attenuation in a given spectral region as a function of the microstructural properties of clouds. The apparatus (illustrated by diagrams) for measuring penetrability consists of a light source, resolving system, a radiation receiver, an intensifier, and emission device. The resolving system of a monochromatic with a lens and a right angle prism. The measurement was made by the method of direct measurement of attenuation of radiation in parallel rays by means of a spectrometer. The attenuation was measured by $\alpha = 1/l \ln(I_{0\lambda}/I_\lambda)$ where $l$ = thickness of cloud layer, $I_{0\lambda}$ = intensity of light with long waves, incident upon the receiver in the absence of clouds, $I_\lambda$ = intensity of light with long waves passing through cloud layer of thickness $l$. The results of measurements show that the experimental values of the indices of attenuation of radiation in clouds in the wave length region 0.5–1.0$\mu$ are in fundamental agreement with theoretical expectations both in regard to absolute value and nature of the dependence upon wave length. The attenuation indices in cumulo-stratus clouds as a rule do not depend upon wave length in the spectral interval 0.5–1.0$\mu$. In such submicrostructure function of the droplets does not constitute more than 2% of the entire droplet-fluid water of the cloud. The indices of attenuation in cumulo-stratus clouds alter principally within the limits of 0.01 to 0.1 $m^{-1}$; this corresponds with the variability of the meteorological distance of visibility from 40 to 400 meters. The mean value for attenuation indices of radiation in clouds is 0.06 $m^{-1}$ in case of a mean water content of 0.26 gm/$m^3$ and a mean total cross section of droplets in a unit of volume $2.7 \times 10^{-4}/cm^{-1}$. *Subject Headings:* **1. Spectral transparency of clouds 2. Spectral transparency instruments.**—*I.L.D.*

12.3–306 551.**521.3**:551.**591.1** (494.4)

Fluckiger, M., **Mesure de l'extinction atmosphérique à Lausanne.** [Measure of the atmospheric extinction at Lausanne.] *Schweizerische Naturforschende Gesellschaft, Geneva. Verhandlungen*, 137:74-79, **1957.** eqs. **DLC** (Q67.S4)—The systematic measurement of atmospheric extinction is discussed. The selenium photocell used as receiver of radiating energy is described. The moon was chosen as star of observation. The method of evaluation is presented. A rapid examination of the diagrams obtained does not permit a statement as to whether the transparency of the atmosphere depends on azimuth. It seems that the presence of the town and Lake of Lausanne is of some influence, because the geographical situation of the university North of them is not too favorable for tasks demanding a calm atmosphere and relatively constant transparency. *Subject Headings:* **1. Atmospheric extinction 2. Lausanne, Switzerland.**—*O.T.*

12.3–307 551.**521.3**:551.**578.7**

Herman, Benjamin M. and Battan, Louis J., **Calculations of Mie back-scattering of microwaves from ice spheres.** *Arizona. Univ. Institute of Atmospheric Physics, Scientific Report*, No. 12, Dec. 31, **1959.** 11 p. 4 figs., 3 tables, 10 refs., 5 eqs. **DWB**—Thunderstorms containing hail have been found to have extremely large radar reflectivities. Experimental work by ATLAS et al., has shown that hailstones may have unexpectedly large back-scattering cross sections. In order to shed additional light on this problem, the normalized back-scattering cross sections ($\sigma_b$) of spherical ice particles with $N = 1.78 - 0.0024i$ were calculated from the complete Mie equations. Small intervals of $\alpha (= 2\pi a/\lambda)$ were taken up to a value of 30. The backscattering from large ice spheres is shown to be considerably higher than that from water spheres of the same size. In general, the differences between the reflectivities of ice and water spheres increase with increasing $\alpha$ up to an $\alpha$ of about 60. Calculations of $\sigma_b$ were made for various values of the complex index of refraction in order to better understand the properties of the back-scattering equations. *Subject Headings:* **1. Mie scattering 2. Back-scattering from ice spheres 3. Hailstones.**—*Authors' abstract.*

12.3–308 551.**521.3**:551.**521.12**

Herovanu, Mircea, **Détermination des paramètres d'Ångström par des observations actinométriques courantes.** [Determination of Ångstrom's parameters from routine actinometric observations.] *Geofisica Pura e Applicata*, Milan, 44:315–321, Sept./Dec. **1959.** 6 tables, 7 refs., 9 eqs. English summary p. 315. **DLC**—By comparing the equalities expressing the solar flux within a wide spectral region on the assumption of an extinction within the atmospheric aerosol given by $\beta_\alpha \lambda^{-2}$ and that of an extinction represented by $\beta$, $\lambda^{-1}$, a relationship is established by means of which: 1) The error is discussed which is done when the air opacity is expressed by $\beta_1$, in the case when $\alpha \neq 1$; 2) a simple and quick method is worked out for determining the parameters $\beta_\alpha$ and $\alpha$ from actinometric observations, carried out within the spectral regions $\lambda < 525$ mμ and 525 mμ $< \lambda < 625$ mμ. *Subject Headings:* **1. Actinometric observations 2. Ångstrom's parameter determination.**—*Author's summary.*

12.3–309 551.521.3:551.591.1

*Miurk, Kh. **O ratsional'nosti indeksa mutnosti *N* Makhotkina.** [Rationality of Makhotkin's index of opacity *N*.] *Esti NSV Teaduste Akadeemia. Füüsika ja Astronoomia Instituut, Uurimusi Atmosfäärifüüsikast,* No. 1:26–42, **1959.** fig. (fold.) 15 tables, 4 refs., 9 eqs. English summary p. 35.—The new index of opacity *N* presented recently by L. G. Mahhotkin has been estimated after its sensibility with respect to intensity *S* and air mass *m* characterized by the numerical values of the expressions $1\partial N/N\partial S$ and $(1/N)(\partial N/\partial m)$. Using the table of the intensity of direct radiation (4) worked out by S. I. Sivkov the value of $(1/N)(\partial N/\partial S)$ has been calculated after formula (5) and the value of $(1/N)(\partial N/\partial m)$ after the formula (8); the results are given in Tables 1 and 2. These tables show, that *N* is of great sensibility with regard to *S* and of little sensibility with regard of *m*. Hence it appears from Tables 7–14, that *N* and the new characteristic of transparency *B* given by the author practically do not depend on *m* and $\sigma B/B < \sigma N/N$. On the basis of the formula (3) the coefficient of rationality of $Nr_N$ (Table 3) has been determined after the intensities presented in the table of Sivkov, which shows that *N* is one of the most rational characteristics of transparency. In order to determine *N* quickly and exactly a nomogram has been constructed (Fig. 1), where $x = \log m$ and $y = N$. *Subject Headings:* **1. Opacity index 2. Transparency.**—*Author's abstract.*

12.3–310 551.521.32:551.576.1

MacDonald, James E. (*Univ. of Arizona*), **Absorption of atmospheric radiation by water films and water clouds.** *Journal of Meteorology,* Boston, 17(2):232–238, April **1960.** 2 figs., 4 tables, 13 refs., 3 eqs. **DWB, DLC**—Spectrally averaged infrared absorptivities of thin water films are computed using recent spectrometric results. A water film 5μ thick irradiated at normal incidence with OC blackbody radiation is found to have a total absorptivity of 0.49, while, for thicknesses of 10, 50, and 100μ, the absorptivities are 0.67, 0.92, and 0.95, respectively. Spectrally averaged reflectivity at normal incidence for bulk water is 0.04. Change in the shape of the blackbody emission curve with a change in temperature from 0°C to 40°C produces negligibly small effect on the spectrally averaged absorptivity and reflectivity. A simple bulk-water method yields infrared cloud absorption half-depth of 17 m for 0.25 g $m^{-3}$ (and 5 m for 1 g $m^{-3}$) liquid water content. Only 0.5 per cent is transmitted deeper than 400 m for 0.25 g $m^{-3}$ or deeper than 100 m for 1 g $m^{-3}$. Evidence for concluding that Mie-theory effects will tend to reduce these absorption depths to still lower values is presented. *Subject Headings:* **1. Infrared absorption spectrum 2. Mie theory 3. Absorption by clouds.**—*Author's abstract.*

12.3–311 551.521.32:633.15

Tooming, Kh., **O spektral'noĭ otrazhatel'noĭ sposobnosti list'ev kukuruzy v oblasti 400–750 mμ.** [Spectral reflective properties of maize in the wave-length range of 400–750mμ.] *Eesti NSV Teaduste Akadeemi. Füüsika ja Astronoomia Instituut, Uurimusi Atmosfäärifüüsikast,* No. 1:68–82, **1959.** 8 figs., table, 9 refs. English summary p. 82.—This paper presents the results of measurements of the spectral reflectivity of maize leaves and stalks carried out at the Tartu Actinometry Laboratory in the summer of 1956 and 1957 by means of a self-recording spectrophotometer of the $C\phi-2M$ type. The character of the spectral reflectivity curves for the beginning of the summer (Figs. 6, 7) differs from that of the curves for late summer and autumn. Especially noticeable are the changes in reflectivity in the absorption band of chlorophyll ($\lambda = 680$ mμ) and over the wave length range 730–750 mμ, an increase in reflectivity at the wave length 680 mμ is connected with a decrease in reflectivity over 730–750 mμ (in the case of low temperatures and low daily totals of global radiation) and vice versa. Fig. 5 gives the curves for the spectral reflectivity of leaves of different age of the same plant. The younger the leaf, the greater is the reflectivity and the narrower is the absorption band of chlorophyll (the reflectivity minimum). *Subject Headings:* **1. Spectral reflectivity of maize 2. Maize.**—*Author's abstract.*

## TEMPERATURE (551.524)

*See also:* **Temp. data, N. Hemisphere** (Sokhrina et al.), 12.3–17; **Upper air temp., Arctic** (Belmont), 12.3–26; **Inflight temp. reports** (Corwin, Frost), 12.3–51; **Airport runway temps.** (Glaser), 12.3–52; **UV radiation effects** (Schulze), 12.3–70; **Temp. effects on corrosion** (Rajagopalan, Ramaseshan), 12.3–96; **Sunspot-temp. relationships** (Visser), 12.3–107; **Sunspot effects on temp.** (Sugawa), 12.3–110; **Temp. calculations** (Sneyers), 12.3–219; **Minimum temp. forecasting** (Kangieser), 12.3–248; **Frost forecasting** (Veitch), 12.3–249; **Tropospheric temp. variations** (Harris), 12.3–263; **Wind distribution during low inversions** (Undt), 12.3–350; **Vertical velocities, temperatures and humidities associated with a shear zone in trade winds** (Bunker), 12.3–361; **Temp. and precip. variations, Japan** (Frolow), 12.3–397; **Temp., Morocco** (Debrach et al.), 12.3–411.

12.3–312 551.**524.36**(612)

Berlage, H. P., **Wat te denken van de afgerond 58°C, op 13 september 1922 te El-Azizia gemeten?** [What to think about the rounded off [temperature of] 58°C measured at Azizia on Sept. 13, 1922?] *Hemel en Dampkring*, The Hague, 57(5):129, May **1959.** Also: van der Bijl, W., **Death Valley het warmst, niet Azizia.** [Death Valley is warmest, not Azizia.] *Ibid.*, 57(5):130, May **1959. DWB, DLC**—In the first article, the author criticizes the reliability of the temperature of 58°C measured at Azizia on Sept. 13, 1922. He refers to Fàntoli (*see* 12.3–313) who explains why it is better to adopt 56°C. In the second article, the author states that the highest temperature on earth, 56.7°C was observed in Death Valley on July 10, 1913. *Subject Headings:* **1. Absolute maximum temperature 2. Azizia, Ligya 3. Death Valley, Calif.**—*A.V.*

12.3–313 551.**524.36**(612)

§*Fàntoli, Amilcare, **La più alta temperatura del mondo.** [The highest temperature in the world.] *Rivista di Meteorologia Aeronautica*, Rome, 18(3):53–63, July/Sept. **1958.** 7 figs., tables, 14 refs. Italian, French, English and German summaries p. 53. **DLC**—The world's record high temperature of 136°F (58°C) at Azizia, Tripoli, during a Ghibli on Sept. 13, 1922 is examined critically as to exposure, effect of instrument shelter or of instrumental error. Records for June–October 1914–1922 are compared, records for pressure, wind and humidity for the period 9–12 Sept. 1922 at 3 stations in Tripoli analyzed and shown graphically, synoptic charts for September 10–14, 1922 shown for the area, and maximum temperatures for 10 places in Tripoli (37°C to 48°C) on 11–14 Sept. are also tabulated. It is concluded that the probable or tentative maximum on Sept. 13 at Azizia was 56°C (133°F), which will be used until a repetition has occurred. *Subject Headings:* **1. Record high temperatures 2. Azizia, Libya.**—*M.R.*

12.3–314 551.**524.36**(43)

Fischer, Rudolf, **Tage mit einem Temperaturmaximum von 30°C oder mehr.** [Days with a maximum temperature of 30°C or higher.] *Meteorologische Rundschau*, 11(1):37, Jan./Feb. **1958. DWB, DLC**—At Frankfurt a.M. the earliest date with a maximum temperature of 30°C (86°F) since 1840 was April 18, 1949 and the latest was Sept. 20, 1947. In Dresden the earliest date was April 17, 1934, and at Aachen the latest was Oct. 19, 1921. At Frankfurt temperatures >30°C prevailed for 12 days consecutively on 2 occasions (in July 1911 and 1947) and on 3 occasions for 10 days (1944, 1952, 1957). In 1947 there were 42 such days (June–September), and in 2 years there were none (1851 and 1878), and on one occasion (1916) only one day >30°C. *Subject Headings:* **1. Hot summer days 2. Maximum temperature frequencies 3. Frankfurt a.M., Germany.**—*M.R.*

12.3–315 551.**524.36**

Kemp, A., **Een opmerking bij hoogste temperaturen op aarde.** [Remark on highest temperatures on earth.] *Hemel en Dampkring*, The Hague, 57(2):47–48, Feb. **1959. DWB, DLC**—In climatological literature, the highest temperature on record near the ground is often said to be 57.7°C, measured at Azizia, Tripoli, on Sept. 13, 1922. The author questions this value referring to C. E. P. Brooks' work, **Climate** (1929) and to an article by G. Hellman, **Grenzwerte der Klimaelemente auf der Erde** (1925). In both works, 56.6° (Death Valley

July 10, 1913) is assumed to be the highest maximum temperature on record. Maximum records are given for several other regions. *Subject Headings:* **1. Record high temperatures 2. Azizia, Libya 3. Death Valley, Calif.**—*A.V.*

12.3–316 551.524.36

Lamb, H. H., **The occurrence of very high surface temperatures.** *Meteorological Magazine*, London, 87(1028):39–43, Feb. **1958.** 2 refs. **DWB**—Conditions favorable for extreme high surface temperatures and examples of record highs for the world 136°F, U. S. (134°F), Europe (123°F), England (100.5°F), Greenwich (100°F), Cairo (118°F), Malta (104°F) are described in some detail. It is found that the optimum situation for a record high is the speeding up and long fetch of warm air advection just ahead of a cold front, plus local conditions, such as forced turbulence or adiabatic descent of already hot air over a cliff or buildings. Even in the Central Sahara some föhn heating is necessary in addition to insolation to allow it to get extremely hot. *Subject Headings:* **1. Extreme high temperatures 2. Record temperatures 3. Temperature extremes 4. England 5. Europe 6. United States.**—*M.R.*

12.3–317 551.524.36(436.14)

*Zawadil, R., **Die heissen Tage in Wien seit 85 Jahren.** [Hot days in Vienna in the last 85 years.] *Wetter und Leben*, Vienna, 9(3/5):50–57, **1957.** 7 tables, 3 figs. **DLC**—In this study of hot days over a period of 85 years on the basis of temperatures recorded at the Central Institute for Meteorology and Geodynamics at Vienna a hot day is defined as a day with temperature mean of at least 25°C; this corresponds to a daily maximum of about 31.3°C. The author discusses characteristics and stages of hot days, the incidence of hot days, series of hot days and forecasting of hot days. Data are presented on the absolute number of hot days for each month (June–Aug.) and mean number of hot days for the period 1892–1956, frequency extremes of hot days, absolute frequency of hot days in nine summer decades, etc.; also situations associated with persistent hot days are described. *Subject Headings:* **1. Extreme temperatures 2. Long period records 3. Extreme temperature frequencies 4. Vienna, Austria.** —*I.L.D.*

12.3–318 551.326.8(282.242) 551.524.37(09)(421)

Huntley, I. D., **The Thames in winter.** *Weather*, London, 12(12):373–376, Dec. **1957.** ref. **DWB, DLC**—An account of numerous occasions since the year 1150 when the Thames froze over at London Town. Some of the most notable freezes were 1281, 1434, 1515, 1564–5, 1620, 1683–4 (Dec.–Feb.), 1709, 1715–16, 1739, 1767–8, 1777–8, 1788–9, 1811 (January) and 1814 (January and March), the last of the great freezes. Since then the city warmth has kept the river from completely freezing over—an open channel remaining in mid-stream. This occurred in 1835, 1853 and 1892 (when the river froze over at Oxford). The chances are considered slim in the future for a freeze which would permit a "frost fair" on the river. *Subject Headings:* **1. Great freezes, Thames 2. Frost fairs 3. Severe winters 4. Thames River, London, Eng.**—*M.R.*

12.3–319 551.524.37(431.5):551.583.14

Knoch, K., **Der Rhythmus der strengen Winter: 200 Jahre zurückreichende Beobachtungen aus Berlin.** [Rhythm of severe winters: 200 years of observations in Berlin.] *Umschau*, Frankfurt a.M., 58(2):40–41, Jan. 15, **1958.** 2 tables. **DLC**—The cyclical occurrence of severe winters in Berlin was investigated on the basis of air temperature data extending over the period 1766–1957. Hellmann's definition of a severe winter was employed as a criterion, namely the sum of negative daily means of temperature. This sum of negative daily means were computed for individual months from November to March for the entire winter. The annual cold totals for each winter from 1766–1767 to 1956–1957 are represented on a barograph and the severe winter (≥360°C) are arranged in a table in order of intensity. An analysis of the severe winters indicates that the general notion that the character of the winter has changed and severe winters are not to be expected is shown to be erroneous. *Subject Headings:* **1. Severe winters 2. Long period records 3. Temperature trends 4. Berlin, Germany.**—*I.L.D.*

12.3–320 551.524.7(99)

Dewar, D., **Average upper air temperatures over Argentine Island.** *Meteorological Magazine*, London, 87(1033):197–201, July **1958.** 3 figs., table, 3 refs. **DWB, DLC** Radiosonde measurements above Argentine Island, Antarctica (65°15'S, 64°16'W) as conducted from July 1954 to June 1957 by the Falkland Islands and Dependencies Meteorological Service were computed and tabulated to show the average monthly temperature for comparison with those at the lower stratosphere (200 mb) and the troposphere (500 mb) above Stanley, Falkland Islands (51°42'S, 57°52'W), with the available data from Larkhill (51°12'N, 0.1°48'W) January 1946–December 1950, and from Skattora (69°42'N, 19°02'E) September 1950–August 1954. The average minimum values of surface temperature at Argentine Island was −9.5°C (994 mb) in August, with maximum +1.0°C (994 mb) in January and at the tropopause −70.2° (233 mb) in August and −53.5°C (299 mb) in February, respectively. A graph featuring average temperature at 500 mb and 200 mb throughout the year at all 4 stations for the period July 1954–June 1957 shows almost identical values in the late autumn but differs greatly in time, elevation and location otherwise. Other graphs show comparative temperatures at Argentine Island vs. Skattora and Larkhill vs. Stanley. Lowest measured temperature at Skattora was −76°C (180 mb) in January 1952 with −91°C (90 mb) at Argentine Island in August 1955, which with an estimated radiation correction of −2°C yields −93°C (the Batavian world record was −91°C). *Subject Headings:* **1. Upper air temperature data 2. Argentine Island, Antarctica.**—*W.N.*

12.3–321 551.524.7:551.571.7:551.576.11

James, D. G. (*Met. Office, London*), **Observations from aircraft of temperatures and humidities near stratocumulus clouds.** *Royal Meteorological Society, Quarterly Journal*, 85(364):120–130, April **1959.** 10 figs., 2 tables, 8 refs. Also: **Discussion** by R. S. Scorer et al., *Ibid.*, 86(367):114–116, Jan. **1960. DWB, DLC**—Observations from aircraft of the Meteorological Research Flight flying near stratocumulus clouds showed steep inversions and hydrolapses directly above the tops of the clouds. Turbulence was encountered below and in the clouds and up to 300 ft above the cloud top. Above this level no turbulence was encountered. Analysis of the heat and water-vapor budgets of the cloud and air below suggests that the cloud and the profiles of temperature and humidity can only be maintained if there is large-scale subsidence. The effects of subsidence, outgoing radiation and turbulent transfer are all comparable. *Subject Headings:* **1. Upper air temperature inversion 2. Upper air humidity 3. Subsidence 4. Turbulence in clouds.**—*Author's abstract.*

## SOIL TEMPERATURE (551.525)

*See:* **Soil temp. measurement** (Květ), 12.3–141; **Permafrost temps.** (Goguel), 12.3–147; **Thermodynamic aspect of earth's interior** (Shimazu), 12.3–148; **Soil temp. variations, Japan** (Frolow), 12.3–397.

## WATER TEMPERATURE (551.526)

*See also:* Sec. F1, . . .; **Sea surface temp. effects on hurricanes** (Fisher), 12.3–288; **Sea temp.-wind correlation, N. Pacific** (Eber, Sette), 12.3–356.

12.3–322 551.526.6

Khanaĭchenko, N. K., **O veroiatnosti opredeleniia sredneĭ temperatury vody za prilivnoĭ period po razovym nabliudeniiam v more.** [Probability of determining mean water temperature during flood tide from single observations in the sea.] *Moscow. Gosudarstvennyĭ Oekanograficheskiĭ Institut, Trudy*, No. 40:91–96, **1957.** 5 figs., table, 4 refs. **DLC** (GC1.M58). Also: Fuks, V. R., **K voprosu o prichinakh periodicheskoĭ izmenchivosti temperatury vody v more.** [Causes of the periodic variability of sea water temperature.] *Meteorologiia i Gidrologiia*, Leningrad, No. 5:59–61, **1958.** 4 figs., 3 refs. **DWB, DLC**—KHANAĬCHENKO believes it is impossible to determine the mean temperature of the sea if single observations are made at places where tidal effects are considerable, unless diurnal and tidal variability are determined and considered. Graphs show variations in water temperature during the day at stations in the Barents Sea and the cause is vividly illustrated as a result of tidal water cycles. The same is true of salinity determinations. FUKS disputes the opinions of KHANAÏCHENKO on the nature of the periodic variability of sea water temperature. With the aid of observational data on temperature and salinity obtained at anchoring stations in far eastern seas it is shown that the advection of heat by tidal currents is significant only in straits and narrows where the velocity of tidal waves is sufficiently large, in the presence of large horizontal temperature gradients, especially in regions with reversing tidal currents. In open seas and oceans periodic variability is principally the result of rise and fall of water particles during tidal oscillation. The horizontal transport of water cannot explain the fact that the largest amplitude of oscillation is observed in the water mass while at the sea surface it is usually slight; this is completely in accord with the theory of internal waves. The author also shows that the greatest amplitude of internal waves is observed precisely in a slightly stratified medium (the upper layer of the sea during the winter-spring period) and not as maintained by KHANAÏCHENKO in well stratified waves. It has been established recently that internal tidal waves can spread with velocities equal to those of spreading surface tidal waves and also with such amplitudes. The tidal currents in the deep are merely a horizontal component of the movement of water particles in tidal orbits during the spread of internal tidal waves. *Subject Headings:* **1. Sea temperature variations 2. Water temperature periodicities.**—*M.R. & I.L.D.*

12.3-323 551.526.6:551.46

Poornachandra Rao, C. (*Met. Office, Bangalore*) **Diurnal variation of certain meteorological and oceanographic factors off Visakhapatnam.** *Indian Journal of Meteorology and Geophysics.* New Delhi, 11(1):35-37, Jan. **1960.** 3 figs., 4 refs. **DWB, DLC**—The diurnal variation of temperature of air, atmospheric pressure and evaporation over sea and of temperature and salinity of sea water about 55 mi off Visakhapatnam coast on 30 Oct. 1952, is studied. Some of the main features are the cooling of air over the sea in the afternoon due to stronger surface wind, the smaller diurnal component of pressure over sea when compared to that of an inland station and the influence of tide besides evaporation on the diurnal variation of salinity. *Subject Headings:* **1. Meteorological effects on oceanic conditions 2. Sea water temperatures 3. Sea water salinity 4. Visakhapatnam, India.**—*Author's abstract.*

12.3-324 551.465:551.526.6:576.8:639.222

†Reid, Joseph L.; Roden, Gunnar I. and Wyllie, John G., **Studies of the California Current system.** *California. Univ. Scripps Institution of Oceanography, Contributions, 1958,* issued **1959.** p. 293-323. 23 figs., 56 refs. "Reprint of *California Cooperative Oceanic Fisheries Investigations, Progress Report* July 1, 1956-Jan. 1, 1958." Printed at California State Printing Office, **1958.** 58 p. **DWB** (551.46 C153co 1958)—The waters of the California Current and their manner of flow in the fishery region of California, both horizontal and vertical have been briefly described. The seasonal variations and long-term variations have been mentioned and some attempt at relating the environment to the organisms has been made. The bearing of these matters upon the central problem of the CCOFI program, that is, the fluctuations in the catch of the sardine and other oceanic fishes, has not been mentioned. One difference between the last decade and the previous period when the sardine fishery was at its height has been pointed out. The temperatures during the early months of the year—the sardine spawning months—have been consistently lower in the last ten years and with certain assumptions inferences bearing upon the sardine problem can be drawn. These cooler months seem to be cooler because the winds were stronger and caused more upwelling. Assuming this relation to hold, and that the low temperatures are indicative of high nutrients, then the result of the enrichment has been higher zooplankton volumes. If this relation between temperature and zooplankton is a real one and has held over the last 20 years, as it did in 1941 and from 1949 through 1956, then we must assume that plankton volumes were smaller in the great period of the sardine fishery than they are now when the sardine catch is much reduced. How the zooplankton and sardines could be so inversely related is beyond the purpose of this report to speculate. It is unfortunate that we do not have a coverage of the area in years when the catch was high or when at least there was a high survival rate. Until such a year occurs any correlations of this sort will be severely limited. *Subject Headings:* **1. California Current system 2. Upwelling 3. Marine ecology.**—*Authors' conclusion.*

12.3–325 551.521.1:551.553:551.526.6

Roden, Gunnar I. and Groves, Gordon W. (*both Scripps Inst. of Oceanog., La Jolla, Calif.*), **On the statistical prediction of ocean temperatures.** *Journal of Geophysical Research*, Wash., D. C., 65(1):249–263, Jan. **1960.** 9 figs., 2 tables, 14 refs., 7 eqs. **DWB, DLC**—Past records of sea-surface temperature are examined and related to wind and solar radiation. There is practically no relation between radiation and sea-surface temperature, but there is a noticeable but small relation between wind and temperature. The best estimate of future values of temperature can be made from past values of temperature, and the use of past wind values slightly improves the prediction. In any case, optimum prediction from statistical considerations alone (Wiener's technique) can account for only about 40% of the variance in the next month's average temperature. *Subject Headings:* **1. Ocean temperature forecasting 2. Wiener's technique 3. Wind effects on ocean temperatures.**—*Authors' abstract.*

12.3–326 551.526.64:551.464

*Mosby, Håkon, **Deep water in the Norwegian Sea.** *Geofysiske Publikasjoner*, Olso, 21(3), Sept. **1959.** 62 p. 38 figs., 19 tables, 15 refs., 13 eqs. **DWB, DLC**—Deep water observations have been regularly collected from Weather Ship Station M (66°N, 2°E) since October 1948. They are studied against a broad background of data from the southern part of the Norwegian Sea, collected by the "Armauer Hansen" since 1914. Below a depth, varying from 200 to 800 m, the water is nearly homohaline, the salinity being 34.92°/₀₀. Due to the great number of observations it is, however, possible to detect minor fluctuations of salinity and also annual variations of temperature, salinity and oxygen content. Maxima and minima occur simultaneously at all deep water levels, but they are out of phase with the seasonal variations of the surface layers. A study of the possible processes of renewal of the deep layers leads to a physical model from which conclusions are drawn as to the vertical distribution of temperature and salinity and also concerning the annual variations. It must be expected that the amplitude of temperature be proportional to the vertical temperature gradient and the amplitude of salinity be proportional to the salinity. Observations seem to agree with these conclusions. When adopting for the eddy conductivity and the eddy diffusivity the same value $A_t = A_s = 2$ in cgs-units, one arrives at a rate of formation of bottom water of 27 m per year and a rate of renewal of the deep water of $14\frac{1}{2}\%$ per year. *Subject Headings:* **1. Deep water chemistry 2. Oceanic chemistry 3. Bottom water research 4. Norwegian Sea.**—*Author's abstract.*

12.3–327 551.464:551.526.64(265/266)

†Wooster, Warren S. (*Scripps Inst. of Oceanog., Calif.*) and Volkmann, Gordon H. (*Woods Hole Oceanog. Inst., Mass.*), **Indications of deep Pacific circulation from the distribution of properties at five kilometers.** *Journal of Geophysical Research*, Wash., D. C., 65(4):1239–1249, April **1960.** 3 figs., 2 tables, 25 refs. **DLC**—A description of the deep Pacific Ocean, based on 145 deep oceanographic stations is presented, showing the distributions of *in situ* temperature, potential temperature, salinity, and dissolved oxygen at a depth of 5 km. At this depth the open Pacific appears to consist of four major connecting basins. Bottom water is introduced at high southern latitudes from the deep Indian Ocean; initially it has the following characteristics: *in situ* temperature, 0.9°C; potential temperature, less than 0.5°C; salinity, 34.7°/₀₀; dissolved oxygen, 5.0 ml/l. Salinity variations at this depth are little greater than measurement errors, the average value for the whole open Pacific being 34.695°/₀₀ with a standard deviation of 0.034°/₀₀. *In situ* temperature increases from south to north, the rate of increase being much greater in the central basin than in either the southern or the northern basin. This increase is attributed to heat flow through the sea floor and to mixing with overlying waters. Both the change of temperature and the observed northward decrease of dissolved oxygen content are consistent with a northward drift of bottom water. The deep water of the eastern North Pacific is presumably the 'oldest' water of the open ocean, its properties having been most extensively modified: *in situ* temperature, 1.6°C; potential temperature, 1.1°C; dissolved oxygen ,3.4 ml/l. *Subject Headings:* **1. Circulation in the Pacific Ocean 2.Pacific ocean basins 3. Heat flow through the sea floor 4. Oxygen content of sea water 5. Pacific Ocean.**—*Authors' abstract.*

12.3–328 551.526.64:551.464:546.211(266)

†Wooster, Warren S. and Cromwell, Townsend, **An oceanographic description of the eastern tropical Pacific.** *California. Univ. Scripps Institution of Oceanography, La Jolla, Bulletin,* 7(3):169–281, **1958.** 2 figs., table, 36 profiles (part col.), 29 refs. **DWB** (551.46 W917oc)—Profiles of an oceanographic survey of the region lying between 23°27′N and 23°27′S and extending westward from the coast of Central and South America to 130°W are examined. Features of interest are those of the distributions of temperature and dissolved substances in various areas along the belt. Much of the eastern tropical Pacific is underlain by a layer at intermediate depths which contain less than 0.25 ml/l of dissolved oxygen, accompanied by a subsurface phosphate maximum layer. This report includes a description of the distributions of temperature and dissolved substances at 2500 m. *Subject Headings:* **1. Ocean temperature distribution 2. Oxygen distribution in Ocean 3. Eastern tropical Pacific.** —*N.N.*

12.3–329 551.526.8:551.481.1(798)

Hobbie, John E., **Thermal studies on Lakes Peters and Schrader, Alaska.** *U. S. Air Force. Cambridge Research Center, GRD Research Notes,* No. 29, Dec. **1959.** p. 98–101. 2 figs., table, 4 refs. **DWB**—Lakes Peters and Schrader exhibited entirely different thermal cycles during the summer of 1958 and show that under certain conditions there is little correlation between thermal cycles of lakes and their geographical location. The time of the thaw, as determined by weather conditions, was perhaps the most important factor in deciding the type of thermal regime. In these two lakes, local conditions such as the glacial influents and shelter from the sun and wind also affected the thermal cycles. Variation in one or several of these factors can completely change the type of thermal cycle in these lakes. *Subject Headings:* **1. Thermal cycles of lakes 2. Alaskan lakes 3. Alaska.**—*Author's conclusion.*

12.3–330 551.526.6:551.547.3

Hanzawa, Masao (*Japan Met. Agency*), **Studies on the inter-relationship between the sea and the atmosphere, Pt. 2.** *Oceanographical Magazine,* Tokyo, 9(1):87–93, Sept. **1957.** 5 figs., 20 refs. **DWB, DLC**—The ultimate aim of long range forecasting of the ocean surface temperature is to predict departures from long term seasonal averages. In this report. a brief review and discussion is given to the study of the relationship between the sea and the atmosphere as an aid to forecasting, with emphasis on the findings derived by the author. The relationship between the mean monthly surface water temperature departures at the ocean weather stations Papa and Tango and the 700 mb height anomalies over the stations are studied. The simultaneous occurrence of a similar trend in water temperature anomalies at these stations is pointed out. *Subject Headings:* **1. Long range forecasting of ocean surface temperature 2. Ocean-atmosphere interaction.**—*Author's abstract.*

# PRESSURE AND WIND

## PRESSURE (551.54)

*See also:* **Pressure data, N. Hemisphere** (Sokhrina et al.), 12.3–17; **Fitting isobaric contours to gradient wind** (Boyden), 12.3–225; **Tropospheric pressure variations** (Harris), 12.3–263; **Pressure-wind relationships at sea** (Bijvoet), 12.3–276; **Ageostrophic components in a jet stream** (Vitek), 12.3–285; **Ocean-atmos. interaction** (Hanzawa), 12.3–330; **Geostrophic winds** (Eber, Sette), 12.3–356; **Water vapor spectra with pressure broadening** (Palmer), 12.3–367.

21.3–331 551.481:551.542:551.515.11:551.511.32:551.577(285:71.73)

Pettersen, S. and Calabrese, P. A., **On some weather influences due to warming of the air by the Great Lakes in winter.** *Journal of Meteorology,* Boston, 16(6):646–652, Dec. **1959.** 4 figs., 8 refs., 10 eqs. **DWB, DLC.** Chicago. Univ. Dept. of Meteorology, Contract AF 19(604)-2179, Scientific Report, No. 7, Feb. **1959.** 20 p. 6 figs., 7 refs., 10 eqs. **DWB.** Also issued in its *Final Report,* Feb. **1960.** Ch. E (20 p.).—The effect of the Great Lakes on the motion and precipitation patterns during a cold spell (Feb. 8–14, 1958) is investigated. By calculating the rotational part of the motion and, also, by resolving the pressure field into orthogonal polynomials, measures of the intensity of the circulation systems associated with the Lakes were obtained. On the average, the heat source maintained a quasi-stationary vorticity system with a center value of about $1.6\times10^{-4}$ sec$^{-1}$ situated at the "center of gravity" of the Lakes. On occasions, separate effects of Lake Huron and Lake Superior could be identified. In general, the precipitation patterns caused by snow flurries from the Lakes revealed marked orographic influences. Well defined patterns, with a band of maximum precipitation about 15–25 miles from the shore was found to occur persistently over the flat plains of northern Indiana and southwestern Michigan. Evidence is produced to show that these patterns are related to the nonadiabatic cooling and decrease in lapse rate of the air that moves from the open waters of Lake Michigan over the colder land. *Subject Headings:* **1. Weather influences 2. Great Lakes effects on weather 3. Great Lakes.**—*Authors' abstract.*

12.3–332 551.**543**:551.**515**:525.622:550.343

Jobert, G. (*Inst. de Physique du Globe, Paris*), **Perturbations des marées terrestres.** [Disturbances of terrestrial tides.] *Annales de Géophysique*, Paris, 16(1):1–55, Jan./March **1960.** 5 figs., 26 refs., eqs. **DLC.**—This study is divided into two parts: Pt. I deals with the deformations of the terrestrial crust due to superficial loads, Pt. II investigates the thermoelastic deformations. Pt I. starts with an account of the classical calculation of the deformation of a homogeneous nongravitating globe, using a vectorial development presented in detail in the appendix. The case of atmospheric tide and the evaluation of the attraction of displaced air masses have been especially examined. The author afterwards considers the case of a regional deformation due to the passage of a depressionary or anticyclonic system in the vicinity of the station and also for this case estimates the attraction of the air masses. Ch. 3 of Pt. I deals with the variation of the elastic properties with depth. In the study of surface relief influence on the deformations, the author considers only the case in which the cross section of the cylindric relief is a circular cubic, thus obtaining a fairly large variety of shapes. Pt. II is devoted to the deformations from thermal origin in order to explain certain observations made in the lunisolar variation of the vertical. The general deformation of the Globe created by a harmonic variation of the superficial temperature is first investigated, and afterwards the case of deformations caused by distributions depending only on one co-ordinate (upheaval symmetry or plane deformation) in the case of regional deformations, is discussed. The above mentioned results are at last applied to the case of localized deformations. *Subject Headings:* **1. Terrestrial tides 2. Atmospheric tides 3. Deformation of the terrestrial crust 4. Thermoelastic deformation 5. Thermal deformation 6. Anticyclone effects on deformation.**—*A.V.*

12.3–333 551.**547.1**:551.509.317

Lee, R., **The use of thickness charts.** *Canada. Meteorological Branch, CIR*-2963, TRA-23, Aug. 22, **1957.** 5 p. 4 figs., 5 refs., 2 eqs. **DWB, DLC**—The paper builds a case for the use of thickness charts, rather than upper level isotherm charts, for determining actual temperatures, isobaric temperature gradients, frontal positions, etc. Briefly discussed are: the relationship between thickness and mean vertical temperature, the use of the tephigram for computation of thickness and mean vertical temperature, determining fronts with maximum horizontal temperature gradient and maximum thickness gradients, thickness lines and vertical shear, and warm and cold air advection. *Subject Heading:* **1. Thickness charts.**—*C.E.P.B.*

## WIND (551.55)

*See also:* **Wind as a factor in air pollution** (Hewson, Baynton), 12.3–88; **Wind velocity measurement** (Svarchevskiĭ), 12.3–234; **Wind systems** (Davidson), 12.3–235; **Wind regime, Barents and Kara Seas** (Antipova), 12.3–247.

12.3–334 **551.55**:**551.501.3**

†Brogmus, Willi (*Hamburg*), **Zum Problem der Windgeschwindigkeitsäquivalente der Beaufortskala.** [Contribution to the problem of wind velocities corresponding to the Beaufort scale.] *Annalen der Meteorologie*, Hamburg, 8(5/6):129–142, **1958.** 5 figs., 6 tables, 24 refs., 2 eqs. **DWB, DLC**—The author discusses the nature of the dependence of wind velocity upon wind force and the nature and the cause of the stochastic relationship between

wind force and wind velocity ($v$). A review of literature on the relationship of wind force and associated wind velocity intervals shows that even under the most favorable circumstances the condition of a unique association is obtainable only approximately. The relationship $v=v(B)$ is determined by using the relative frequencies of the Beaufort number corresponding to wind velocities. The application of the method of least squares to obtain an expression for the velocity intervals is obtained namely: $v_{B.\,B+1}=\Sigma h_1 v_1+\Sigma H_1\cdot v_1/\Sigma h_1+\Sigma H_1$ where $v_{B.\,B+1}$ = the wind velocity at the upper boundary of the Beaufort scale velocity interval, $v_1, v_2, v_3 \ldots v_i$ = the next higher integral wind velocity, $V_1, V_2, V_3 \ldots V_i$ the wind velocities corresponding to $B+1$ and which are smaller than the boundary velocities, and $h_i$ and $H_i$ = corresponding relative frequencies. The value of the numbers is given by $\bar{v}_B=v_{B-1,\,B}+v_{B,\,B+1}/2$. Example of the application of this method of equivalent calculation is presented and a comparison of the mean equivalent wind velocities computed by the least square method with methods involving means of Beaufort wind intensities at wind velocity (2) and mean of wind velocities ($v$) with constant wind intensity ($B$) indicates that the lead square method provides accurate results. *Subject Headings:* **1. Wind velocity equivalents 2. Wind force 3. Mean equivalent wind velocities.** —*I.L.D.*

12.3–335 551.55(437.6):551.506.3

*Petrek, Jozef, **Vietor na Skalnatom Plese v r. 1946–1955.** [Wind at Skalnaté Pleso in in 1946–1955.] *Meteorologické Zprávy*, Prague, 11(4/5):85–92, 1958. 3 figs., 13 tables, 4 refs. Czech, Russian and German summaries p. 85. **DWB, DLC**—Wind conditions at Skalnaté Pelso, Tatra Mountains, are analyzed for the ten-year period 1946–1955. The measurements of wind direction and of average and momentary speed were made by means of a universal Fuess anemograph having a range up to 80 m/sec. The paper contains tables and graphs on daily and annual variations of wind direction and various statistical characteristics of wind speed. The observatory on Skalnaté Pelso is located at an elevation of 1783 m. *Subject Headings:* **1. Wind data analysis 2. Skalnaté Pelso, Czechoslovakia.**—*G.T.*

## TURBULENCE (551.551)

*See also:* **Turbulence effects on water** (Phillips), 12.3–187; **Vertical gust velocity** (Dubov), 12.3–226; **Showalter Stability Index** (Hannay), 12.3–256; **Wind and turbulence effects on dispersal of radioactive particles** (Chamberlain), 12.3–267, **Wind and turbulence effects on dispersal of radioactive particles** (Crabtree), 12.3–268; **Turbulent flow** (Corrsin), 12.3–278; **Natural occurrence of turbulence** (Stewart), 12.3–279; **Vertical velocities, temperatures and humidities associated with a shear zone in trade winds** (Bunker), 12.3–361.

12.3–336 551.551:551.554

Partl, Willibald (*Deutsche Lufthansa, German Airlines, Hamburg*), **Isentropic thermal shear in meteorological navigation.** *Navigation*, Los Angeles, 6(6):374–382, 1959. 17 figs. **DWB, DLC**—If we summarize ITS in one diagram and in a few concluding words, we can say that the main effects of ITS are: 1) local wind variations and formation of low stratiform clouds caused by unequal heating and cooling of the earth's surface; 2) a windshear on the frontal zone effecting under-geostrophic windspeed on the cold-air side and super-geostrophic windspeed on the warm-air side; 3) super-geostrophic windspeeds in the levels between adjacent warm and cold air masses in the tropopause. *Subject Heading:* **1. Isentropic thermal shear.**—*Author's abstract.*

12.3–337 551.551:623.451.8

Press, Harry and Steiner, Roy (*both, Langley Aeronautical Lab. Langley Field, Va.*), **An approach to the problem of estimating severe and repeated gust loads for missile operations.** *U. S. National Advisory Committee for Aeronautics, Technical Note*, 4332, Sept. 1958. 44 p. 9 figs., 10 refs. 34 eqs. **DWB** (629.1308 U585tn)—An analysis of available information on atmospheric turbulence is presented in order to arrive at a simple description of the atmospheric turbulence environment appropriate for missile operations. This simplified description is utilized to derive methods of estimating severe and repeated gust loads in missile operations in terms of missile response characteristics and operating parameters for given probabilities of exceedance. *Subject Headings:* **1. Atmospheric turbulence 2. Gust loads 3. Missile operations.**

12.3–338 551.551:535.3

Rona, Thomas P., **Target contour fluctuation of atmospheric origin in optical reconnaissance research.** Seattle, Wash., Boeing Airplane Company, Feb. **1960.** 35 p. figs., tables, 6 refs., eqs. **DWB** (M93.1 B671ta)—The quantitative effect of atmospheric turbulence on the apparent position fluctuation of a terrestrial target contour is investigated. The viewpoint chosen is the one of a high-altitude observer located outside of the atmosphere and interested in high resolution optical transmission along an essentially vertical path. It is found on basis of reasonable assumptions of pressure and temperature fluctuations that the effect on optical resolution of atmospheric turbulence under these conditions is of the order of a few centimeters at the most. Optical resolution should thus not be limited by atmospheric turbulence. These conclusions are corroborated by stellar observations. An experimental confirmation method and apparatus is outlined. *Subject Headings:* **1. Atmospheric turbulence 2. Optical resolution of atmospheric turbulence.**—*Author's abstract.*

12.3–339 551.551:551.510.42:519.241.6

Smith, F. B. (*Met. Office and Chem. Defence Exp. Estab., Porton, Eng.*), **The turbulent spread of a falling cluster.** *Advances in Geophysics*, N. Y., Vol. 6, pub. **1959.** p. 193–210. 9 figs., 6 refs., 33 eqs. **DWB, DLC**—The paper considers the expansion of a cluster of particles under the action of isotropic homogeneous turbulence when the terminal velocity of the particles is great enough for the effect of Lagrangian decay of the eddies on the expansion of the cluster to be neglected, whilst small enough for the particles' response to the velocity fluctuations affecting the expansion to be almost perfect. The range, so defined by these conditions, varies with cluster size and spectrum shape; one fairly typical range is shown to be 0.5 m/sec–2 m/sec. Within the range, the equation governing the expansion is formulated purely in terms of the Eulerian properties of the turbulence, namely the variance $\overline{u^2}$ and the space correlogram. On the assumption that the cluster is defined by only one characteristic length (i.e. that the shape of the statistical distribution of particles within the cluster is maintained during the expansion) the equation may be solved. Typical expansion curves are given showing the standard deviation $\sigma$ of the cluster as a function of time for several values of terminal velocity and initial size. These show that the rate of expansion of the cluster decreases as particularly sensitive to the initial cluster size. The general shape of these curves appears to be consistent with the predictions of similarity theory. In the third section, the modified spectrum of turbulence and appropriate length-scale as experienced by a cluster are obtained as functions of the cluster size. *Subject Headings:* **1. Turbulence 2. Turbulence spectrum.**—*Author's abstract.*

12.3–340 551.551.2:551.43

Scultetus, Hans Robert (*Hamburg*), **Geländeausformung und Bewindung in Abhängigkeit von der Austauschgrösse.** [The dependence of terrain formation processes and wind on turbulent exchange values.] *Meteorologische Rundschau*, Berlin, 12(3):73–80, May/June **1959.** 15 figs., 2 refs. **DWB, DLC**—The special wind conditions of the state forest settlement south of Cleve are shown to be determined by the characteristic conditions of the terrain which is described here by the addition of two terrain profiles in the vicinity of the state forest settlement. In the case of south west and north north east directions the air is forced to ascend along a steep slope. On the adjoining plateau where the upward forced air again strikes the ground there is a region of higher wind velocity. In the case of southwest wind the flow is again pushed upward after this collision so that at greater distance there is formed an area of greater wind velocity. Data and analyses are presented on the influence of wind direction, dependence of wind direction in the measurement terrain upon the wind direction at the zero position, exchange magnitude, wind direction, and direction and wind strength in the measurement terrain. *Subject Headings:* **1. Turbulent exchange 2. Topographic effects on turbulence 3. Wind regime of forests 4. Cleve, Germany.**—*I.L.D.*

12.3–341 551.551.8:551.574.1:551.576.1

†Dingle, A. Nelson, **The role of atmospheric turbulence in the agglomeration of cloud particles.** Michigan University. Research Institute, Ann Arbor, Contract AF 19(604)-2176, Final Report, Dec. **1959.** p. 1–45 10 figs. (incl. photos), 147 refs., 10 eqs. p. 47–51, Elder, Floyd C., **Weather radar observations under Project Hi Cue at Flagstaff, Arizona during July and Aug. 1959.** table. **DWB** –A literature review of materials pertaining to the coalescence of cloud droplets in forming rain and to the prominent factors that influence this process is presented. Laboratory work in evolving a method for producing individual vortices reproducibly is discussed, and an airfoil modeled for use in a cloud chamber is described. The development of a 24-ft$^3$-capacity continuous cloud chamber is described, and the results of tests and analyses of its performance are reported. Satisfactory means of monitoring the cloud-chamber contents throughout experiments without disturbing the chamber and the cloud equilibrium are under study. A program of measurements of rain under Project Hi Cue was conducted at Flagstaff, Arizona, during July and August, 1959, using the van-mounted APQ-40 radar unit. Data were recorded photographically. The data remain to be analyzed. *Subject Headings:* **1. Atmospheric turbulence 2. Cloud droplet coalescence 3. Cloud chamber 4. Cloud equilibrium 5. Rain formation.**—*Author's abstract.*

12.3–342 551.551.8:551.584:681.14

House, G. J.; Rider, N. E. and Tugwell, C. P., **A surface energy-balance computer.** *Royal Meteorological Society, Quarterly Journal,* 86(368):215–231, April **1960.** 4 figs., 3 tables, 17 refs., 14 eqs. **DWB, DLC**—A surface energy balance computer is described. This is fed with such information as dry- and wet-bulb temperatures and temp. differences in the vertical (in the form of fine wire thermocouple outputs) and wind speed differences. The psychometric equation is solved automatically to yield a vapor-pressure difference and the latent-heat term is then computed on the basis of an aerodynamic equation. The sensible-heat term is similarly made available. The net flux of radiation and the soil-heat flux are also recorded. A determination of each of these four fluxes is made once per minute and the values are integrated and presented on counters which are photographed at desired intervals, the smaller interval so far used being 20 min. Results indicate that for periods of an hour or more the "positive" and "negative" terms in the surface-heat balance equation so obtained, agree to about 10% except when the heat storage in the first two cm of soil, of which no account is taken, is obviously changing. The only complete 24 hr observational period so far covered indicates a daily balance to a fraction of a mw hr cm$^{-2}$ over approximately 80 hr observations, which were not continuous but contained about an equal number of daylight and dark hours, a balance to better than 1% was obtained. A further result, which requires additional confirmation, is that the daily water loss from the centre of an extensive short-grass area which has an ample water supply may be obtained for all practical purposes by measuring the total net radiation and assuming that all is used in the evaporative process. It becomes obvious that if hourly mean values of the profiles of temp., humidity and wind are used to compute the evaporation then, in general, the results will be in error by up to about 20%, although daily totals may be more accurate than this. The machine as it stands is not reliable for continuous operation owing to the use of a number of electro-mechanical devices which are required to work under conditions for which they were not designed. Some improvements will be required before reliable continuous operation becomes possible. *Subject Heading:* **1. Energy balance computers.**—*Authors' abstract.*

## WIND DISTRIBUTION AND VARIATION (551.552/53)

*See also:* **Effect of wind changes on forest fires** (Larkins), 12.3–85; **Wind pattern representation** (Untersteiner), 12.3–221; **Gales, Suttsu District** (Tanaka), 12.3–231; **Pressure-wind relationships at sea** (Bijvoet), 12.3–276; **Wind effects on ocean temp.** (Roden, Groves), 12.3–325.

12.3–343 551.552:551.554

Soós, Eva (*Offenbach a.M.*), **Windmaxima mit und ohne Nullschichtcharakter.** [Wind maxima with and without zero layer characteristics.] *Meteorologische Rundschau,* Berlin, 12(4):118–120, July/Aug. **1959.** 2 figs., 4 tables, 3 refs. German summary p. 118. **DWB, DLC**—Using a criterion established by ATTMANSPACHER for the dependence of the horizontal wind with altitude, the author investigated 2132 maxima in the vertical wind distribution in order to determine whether they are associated with a reversal of the vertical motion. 68.8% of all wind maxima were recognized as zero layer values. Maxima in the vertical direction without the properties of zero layer are only transitory phenomena. The probability that a maximum manifests aero layer characteristics in greater, the closer the wind maximum lies near the average height of the zero layer. Nevertheless there were found 344 cases in which 2 (in 71 cases) or 3 layers occurred with reversal of vertical movement. *Subject Headings:* **1. Wind maxima 2. Zero layer.**—*Transl. of authors' abstract.*

12.3–344 **551.553.12**

Gutman, L. N. and Koronatova, T. D., **K teorii vetra sklonov.** [Theory of slope winds.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 10:1238–1248, Oct. **1957.** 2 figs., table, 8 refs., 32 eqs. **DLC.** Transl. into English in the corresponding number of the *Akademiia Nauk SSSR, Bulletin of the Academy of Sciences, USSR, Geophysics Series.* **DLC**—The general system of equations for local winds is investigated and simplified by considering a specific slope wind. A precise solution of a simplified non-linear system of equations corresponding to a slope wind (in the absence of general gradient wind) is obtained for the case of a smooth terrain, symmetrical relative to some axis. Examples of actual solutions are presented. *Subject Heading:* **1. Slope wind theories.**—*Transl. of author's abstract* (*I.L.D.*).

12.3–345 **551.553.2**(495)

Karapiperis, Léon H. (*Athens, Greece*), **Sur la marche annuelle de l'intensité du vent dans la péninsule hellénique.** [Annual variations of wind intensity over the Greek peninsula.] *Geofisica Pura e Applicata*, Milan, 44:296–302, Sept./Dec. **1959.** 6 figs., table, 7 refs. French and English summaries p. 296. **DLC**—The annual march of the wind intensity in Greece is studied on the basis of the anemological data of 31 stations. The considered stations have been classified in 6 types resulting from the annual march of the wind intensity; the reasons justifying such a classification are discussed. The annual range of the wind intensity is greater in the insular and littural regions than in Hellenic Peninsula's interior. *Subject Headings:* **1. Wind intensity data 2. Greece.**—*Author's abstract.*

12.3–346 **551.553.21**:**551.579.4**(282.253)

Naqvi, Syed Sibte Nabi, **Pulsating monsoon in Southeast Asia and associated floods in the Indo-Gangetic river systems.** *Pakistan Science Conference, 11th, Karachi, Feb. 5–10, 1959,* [*Proceedings*], issued Lahore, **1959.** p. F1–F14. photo, 10 figs. (loose in back pocket), 17 refs. **DWB** (M53.21 N217 pu)—The broad features of the southwest monsoon in the Indo-Pakistan sub-continent, the characteristics and causes of its pulsations and of the floods in the Indus and Gangetic basins caused by the depression and storms resulting from those pulsations are discussed and graphically presented. It is consistently shown that although physical causes provide the energy and the motive force of the monsoon circulation, thus making primarily important the thermodynamic and hydrodynamic factors, the geographic factors also play an equally fundamental role in this process. The general conclusion drawn from the study is that the economics and the anthropology of the region is deeply influenced by the shape and relief of the land-masses; by the position on the earth's surface of those shapes and reliefs and by their relative positions to the oceans from which arise water-vapors and energy which come down on condensed water over those land-masses. *Subject Headings:* **1. Monsoon effects on floods 2. Floods 3. Indo-Gangetic river systems 4. Pakistan 5. India.**—*I.S.*

12.3–347 **551.553.6**(438)

Wierczek, Elżbieta (*Zespół Katedr Geografii Fizycznej U. J.-Kraków*), **Czestotliwość występowania poszcaególnych kierunków wiatrów dolnych W Karpatach zachodnich** (**Na obszarze województwa Krakowskiego**). [Direction frequency of low winds in the western Carpathians of Krakow Province.] *Przegląd Geofizyczny*, Warsaw, 3(3/4):229–234, **1958.** fig., 16 refs. French summary p. 234. **DWB, DLC**—Records of the frequency and directions of winds over the western Carpathian Mountain area were compiled during 1891–1910 at 20 stations. SW and W winds are very frequent in the Krakow area. The westerlies (47.3%) and easterlies (15.7%) blow into the Vistula Valley. *Subject Headings:* **1. Wind frequency and direction data 2. Krakow Province, Poland.**—*N.N.*

12.3–348 551.553.8:551.515.1:333(22)

Kron, I. G., **Shtorm v raïone ostrova Mud'iug 16 noiabria 1957 g.** [A storm in the region of Mud'iug Island on Nov. 16, 1957.] *Meteorologiia i Gidrologiia*, Leningrad, No. 12:40–41, Dec. 1958. **DLC**—The storm on Mud'iug Island in the White Sea was characterized by gusts of 30–40 m/sec. The strength of the wind is indicated by the fact that the water level in Dvina Bay rose to 262 cm above zero, the average level varies between 60 and 80 cm. As a result of the high level the sea waves did not break but bore down on buildings and caused considerable damage. During the storm the western coast of the island was displaced several meters.. *Subject Headings:* **1. Storm damage 2. Mud'iug Island, White Sea.** –*I.L.D.*

## VERTICAL DISTRIBUTION AND SPECIAL WINDS (551.554/55)

*See also:* **Gradient wind calculations** (Boyden), 12.3-225; **Isentropic thermal shear** (Partl), 12.3-336; **Wind maxima** (Soós), 12.3-343; **Vertical velocities, temperatures and humidities associated with a shear zone in trade winds** (Bunker), 12.3-361.

12.3–349 551.555.1:551.510.62:621.396.1

Katzin, M.; Pezzner, H.; Koo, B. Y. C. et al., **The trade-wind inversion as a transoceanic duct.** *U. S. National Bureau of Standards, Journal of Research, Sec. D (Radio Propagation)*, 64(3):247–253, May/June 1960. 6 figs., 4 tables, 6 refs., eq. **DWB, DLC**—Radiosonde data for stations in the South Atlantic trade-wind belt are analyzed to determine the potentialities of the trade-wind inversion as an elevated duct for transoceanic radio transmission. These were supplemented by refractometer soundings made by an aircraft during the latter part of 1958. These records indicate that a duct is present in the majority of the cases. Since it is known that the radiosonde underestimates ducting because of its slow response, it is concluded that a duct is present practically all the time. On the basis of the data analyzed, an experiment with two aircraft is suggested to test the propagation potentialities of this mechanism. A frequency of around 200 megacycles per second appears to be a good choice for an initial experiment. *Subject Headings:* **1. Trade wind inversion 2. Transoceanic ducts.**—*Authors' abstract.*

12.3–350 551.552:551.524.4(436.14)

†Undt, W., **Windverteilung bei tiefliegenden Inversionen in der kälteren Jahreszeit im Gebiet von Wien in den Jahren 1952–1957.** [Wind distribution during low inversions in the cold season in the Vienna region, 1952–1957.] *Wetter und Leben*, Vienna, 10(3/4):41–50, 1958. 6 tables, 26 refs. **DLC**—The history of the study of inversion, the meteorological conditions leading to the occurrence of inversions, the properties of inversions, the various types of inversions—ground inversion, radiation inversion, subsidence or contraction inversion, turbulence inversion, mountain inversion, upglide inversion, frontal and trade wind inversion, and the medical meteorological significance of inversions, are discussed. In connection with a study of the relationship between cold and inversions in Vienna, the incidence and characteristics of the latter over the five year period, 1952–1957, were investigated for the relevant months October–April. Data are presented on the number of days with inversions, according to months and elevation, during the afternoon; layer thickness of low lying inversions by months during the afternoon; wind distribution for low lying inversions by months during the afternoon and on days with low lying inversions and temperature gradients ≤0.4°C/100 met; wind intensity in Beaufort scale on days with low lying inversions, and cloudy days during low lying inversions. *Subject Headings:* **1. Inversion studies 2. Wind distribution during low inversions 3. Vienna, Austria.**—*I.L.D.*

12.3–351 551.555:551.578.45(498)

Bălescu, O. I. and Beşleagă, N., **Repartiţia teritoriala a viscolelor in R.P.R.** [Territorial distribution of "viscole" in Romania.] *Meteorologia, Hidrologia şi Gospodăirea Apelor*, Bucharest, 4(1):16–24, 1959. 4 figs., 4 tables, 2 refs. Russian, French, and English summaries

p. 77–80. **DWB**—Analyzing the "viscole" (Romanian term for the complex phenomenon of wind intensification and snowfall) recorded in Romania during periods between 20 and 74 years, the authors find that the phenomenon is more frequent in the southern and eastern part of the country. January for the eastern part of the country and February for the other regions present the highest values of the phenomenon's frequency. The Bărăgăn plain is characterized by the greatest percentage of years when the "viscole" lasts more than nine days. During the "viscole," the wind's direction predominates from NW in Moldavia, E in the south and N in Transylvania. The most frequent mean speed of the wind during the "viscole" is comprised between 10 and 17 m/s. *Subject Headings:* **1. Viscole frequencies 2. Blizzards 3. Romania.**—*Authors' abstract.*

## WIND EFFECTS (551.556)

*See also:* **Wind effects on structures** (Biggs et al.), 12.3–1; **Wind effects on jet flights** (Pike et al.), 12.3–45; **Windbreak effectiveness** (Schultz, Kelly), 12.3–66; **Wind effects on motor vehicles** (Benner), 12.3–89; **Wind damage to roofs** (Lawson), 12.3–90; **Wind power utilization** (Bhatia), 12.3–91; **Salty wind damage to power lines** (Sanpei), 12.3–94; **Wind effects on water surfaces** (Phillips), 12.3–187; **Wind effects on water surfaces** (Spătaru), 12.3–188; **Wind effects on dispersal of radioactive elements** (Chamberlain), 12.3–267; **Wind effects on dispersal of radioactive elements** (Crabtree), 12.3–268.

12.3–352 532:551.556.8:551.461.2

Hühnchen, R. (*Heidenau*), **Beitrag zur Strömungskunde.** [Contribution to fluid mechanics.] *Die Technik*, Berlin, 12(9):626–632, Sept. **1957.** 8 figs., 6 refs., 70 eqs. **DLC**—A theory is developed for the motion of a water particle slightly beneath a water surface under the action of wind gusts, including expressions for the motion of wind gusts, wind friction at the water surface, and horizontal and vertical stresses under water. *Subject Headings:* **1. Fluid mechanics 2. Wind effects.**—*G.T.*

12.3–353 551.556.8:551.465

Ozaki, Koichi (*Nagasaki Marine Observ.*), **On the strong wind and high waves encountered on board of M.S. Shumpu-Maru in east China Sea on Jan. 15–18, 1959.** *Umi to Kisho,* (Japan), 4(12):7–15, **1959.** 12 figs., 2 tables, 4 refs. In Japanese; English summary p. 7. Reprinted from *Oceanography and Meteorology*, Nagasaki, Japan, 9(182), **1959.**—The M.S. "Shumpu-Maru" sailed in the middle part of East China Sea from Nagasaki to Kagoshima on 14–18, Jan. 1959. During this voyage, the author observed the frontal cloud bank near Meshima Island on the morning of Jan. 15 and met with strong wind on the midnight of Jan. 16. This paper shows an analysis of these weather conditions in connection with instability line and downdraft, and explains the high wave on 16–18, Jan. 1959 from the point of wave forecasting. *Subject Headings:* **1. Wind effects on waves 2. China Sea.**—*Author's abstract.*

12.3–354 551.461.2:551.556.8

Rossiter, J. R. (*Liverpool Obs. and Tidal Inst.*), **Research on methods of forecasting storm surges on the east and south coasts of Great Britain.** *Royal Meteorological Society, Quarterly Journal*, 85(365):262–277, July **1959.** 12 figs., 3 tables, 12 refs., 5 eqs. **DWB, DLC**—Recent work at the Tidal Institute has provided means of predicting storm surges at the River Tyne entrance, Immingham, King's Lynn, Lowestoft and Southend in the North Sea and Newhaven in the English Channel, from meteorological forecasts. An investigation of surges at Aberdeen has not resulted in a completely satisfactory method of predicting external surges, which are generated outside the North Sea, so that their effects at ports further south have been allowed for by observing their magnitude at Aberdeen and applying an empirical rule which governs their amplification and rate of travel, after Corkan (1948). The disturbances generated inside the North Sea proper, at all the other North Sea ports except King's Lynn, have been correlated at intervals of 6 hr with quantities representing the tractive force of the gradient winds at chosen points in the sea, assuming a quadratic law of friction. The success of the formulae so produced is fully illustrated. For King's Lynn, tide and surge have been treated as an entity, and high- and low-water heights have been expressed as functions of the corresponding heights at the River Tyne and the local wind strength and direction. The propagation of North Sea surges through the Straits of Dover has been studied using Newhaven observations, and it is shown that they travel from Lowestoft as free progressive waves, being attenuated by half. Depressions in the western approaches to the English Channel are also shown to be responsible for disturbances at Newhaven. *Subject Headings:* **1. Storm surge forecasting 2. British coastal areas.**—*Author's abstract.*

12.3–355 551.556.8:551.46(267)

Venkiteshwaran, S. P. (*Met. Office, Poona*), **Swells in the Bay of Bengal associated with storms in November.** *Indian Journal of Meteorology and Geophysics*, New Delhi, 11(1):30–34, Jan. **1960.** 5 figs., 4 refs. **DWB, DLC**—The observations of swell and wind from ships in the Bay of Bengal in and adjacent to a storm field charted on synoptic maps were combined to form a composite chart keeping the position of the surface observations relative to the centre and direction of movement of the storm the same. It is observed from these charts drawn for different storms in the month of Nov. that (1) over all regions of the storm, the direction of the wind and the swell are generally inclined in such a way that an observer facing the direction in which the swell moves finds the wind blowing from a direction which is inclined to his right, (2) there is comparatively larger difference in the direction of the swell and that of the wind in the front left sector of the storm field, (3) ELIOT's conclusion that the direction from which the swell is experienced outside the storm area nearly coincides with the direction of movement of the storm centre does not hold so well in the right rear quadrant as in the other regions. *Subject Headings:* **1. Ocean swell 2. Bay of Bengal.**—*Author's abstract.*

## UPPER AIR WINDS (551.557)

*See also:* **Upper air wind forecasting** (Sorenson), 12.3–43; **Jet stream effects** (Whittingham), 12.3–86; **Upper air currents** (Gandin, Alimova), 12.3–244; **Synoptic evolution of 500 mb flow pattern** (Smith), 12.3–246; **Tropospheric wind variations** (Harris), 12.3–263; **Upper air winds, Arctic** (Hare), 12.3–265; **Long range travel of radioactive cloud** (Stewart, Crooks), 12.3–271; **Upper air circulation** (Sprenger), 12.3–281; **Ageostrophic components in a jet stream** (Vítek), 12.3–285; **Vertical velocities, temperatures and humidities associated with a shear zone in trade winds** (Bunker), 12.3–361; **Upper air flow effects on monsoons** (Srinvasan), 12.3–401.

12.3–356 551.557:551.542.1:551.526.6:551.465(266)

*Eber, Laurence E. and Sette, Oscar E. (*both, Bureau of Commercial Fisheries*), **Indices of mean monthly geostrophic wind over the North Pacific Ocean.** *U. S. Fish and Wildlife Service, Special Scientific Report—Fisheries* No. 323, Sept. **1959.** 108 p. 11 figs., numerous tables, 7 refs. **DWB** (639.206 U583sp)—Geostrophic wind components computed from monthly mean atmospheric sea level pressure charts are employed as indices of wind intensity over the principal current systems in the North Pacific Ocean. Pressure differences across pairs of points at 36 locations and deviations from long-term monthly means are tabulated for a 33-year period, 1926–58. The data for certain locations were combined to form regional indices representing wind components tangential to the major North Pacific Ocean currents. The mean seasonal cycles of these indices show marked differences in phase and amplitude for the various regions. Monthly anomalies are found to have generally larger magnitudes in winter months than in other seasons. Some evidence of long-term trends is indicated by graphical representation of time series and decade means. In particular, weak wind components occurred over the Oyashio and Alaska currents during the winter months of the period 1946–55, while over the California current the wind components were stronger, than during the previous two decades. Application of the wind index data is illustrated by a simple comparison with sea temperature. A correlation was found between paired values of wind indices and sea temperatures off British Columbia in January, which is consistent with the concept of wind-induced advection. Similarly paired values for later months were not significantly correlated. A tentative explanation may lie in the larger magnitude of wind fluctuations in January, coupled with persistence of the sea temperature anomalies. *Subject Headings:* **1. Geostrophic winds 2. Wind index data 3. Sea temperature-wind correlations 4. Pacific ocean currents 5. Pacific Ocean.**—*Authors' abstract.*

12.3–357 551.557:551.510.535:621.396:523.53

Rao, M. Srirama and Armstrong, R. L., **Investigation of the drifts of the effective point of radio reflection along a meteor train.** *Canadian Journal of Physics*, Ottawa, 36(12):1601–1623, Dec. **1958.** 12 figs., 4 tables, 16 refs., 36 eqs. **DWB, DLC**—The concept of the effective point of radio reflection from a meteor train has been given on the basis of atmospheric turbulence, on a vertical scale of the order of 100 m to 6 km, in the M region. Some experimental evidence has been provided to support the postulate of its drifting along the train, using meteoric body doppler radar records, taken on 30.02 Mc/s at South Gloucester, during the Geminid shower periods of 1948–50. The velocities ($V_s$) of the above drifts in the case of 90 observations have been calculated, using the ranges of the observed meteors as obtained from the rante-time records taken simultaneously on pulsed radar on 32.7 Mc/s at the Metcalfe Road field station (7.5 km distant). It is found that these velocities tend to have higher values in the case of shorter echo durations and vice versa. Theoretical interpretation of the observed results has been attempted. Reasonable assumptions of the ionization distribution along a meteor train and of diffusion rates at different levels in the M region have been made to derive the echo durations from different portions of a meteor train. Variation of these echo durations with position on the train has been taken into account to calculate the theoretical curves of vertical components of $V_s$ vs. total echo durations, in the case of a geminid shower. The effect of turbulence on echo durations has been taken into account to explain the observed results successfully. *Subject Headings:* **1. Radio reflections from meteor trails 2. Ionospheric winds.** —*Authors' abstract.*

12.3–358 551.557

Uhlig, S., **Strahlströme.** [Jet streams.] *Umschau*, Frankfurt a.M., 24(59):757–758, Dec. **1959.** fig., ref. **DLC**—A report on a conference on the jet stream held by the Frankfurt a.M. branch of the German Meteorological Society and the German Weather Bureau during Oct. 7–8, 1959 in Offenbach. Jet streams are found in the vicinity of the tropopause both in the Northern and Southern Hemisphere; they move from west to east. The most marked jet stream is in the transition zone between the tropical and polar air masses, usually between latitudes 50 and 60°. The principal jet stream aloft occurs mostly north of young wave disturbances of the polar front, but wanders south of the polar front with aging of low pressure centers. Since the origin of the jet stream is attributable to thermodynamic processes the principal jet stream is found above the zone of largest horizontal temperature differences of the mean or deep troposphere. In winter the principal jet stream is displaced southward and is lower than in summer; in northerly latitudes it is lower than in southerly latitudes. Zones of maximum and minimum velocity alternate. The former manifest larger variations in intensity within short time intervals. *Subject Heading:* **1. Jet stream.**—*I.L.D.*

12.3–359 551.557.2(512.317)

*Gill, D. S., **Analysis of wind at 300 and 200 millibars over Hong Kong.** *Meteorological Magazine*, London, 87(1037):338–342, Nov. **1958.** 5 tables, 6 refs. **DWB, DLC**—R. F. M. Hay (see 4.11–194) gave mean vector winds over Hong Kong up to 60 mb taken from radar wind ascents during 1950–51. This paper constitutes an extension of this work to cover 1952–54 radar and radiosonde ascents. Tables give 300 and 200 mb monthly mean vector and scalar winds and standard vector deviations for each month of each year and for the period 1952–54. Missing observations give a bias in favor of lower wind speeds. Mean monthly zonal components, probable error and constancy; wind speeds equalled or exceeded on 5% of occasions during each month as calculated from Brooks and Carruthers formula and as observed; maximum observed wind speed; frequencies of wind speeds in winter and summer in 10 kn categories; and actual values of sigma compared with calculated, assuming a normal circular distribution, are given in tables and discussed. Conclusion is that winds over Hong Kong tend to be strongly westerly in winter and weaker easterly during summer months, and that the wind distribution is noncircular in March, May, June, Oct. and Nov. at 300 mb and in May, June, July, Oct. and Nov. at 200 mb. *Subject Headings:* **1. Upper air wind distribution 2. Circular-normal wind distribution 3. Hong Kong.**—*M.R.*

12.3–360 551.557.3:551.513.1

Faust, Heinrich (*West German Weather Service, Offenbach*), **Nullschichteffekt und allgemeine Zirkulation.** [Zero layer effect and general circulation.] *Geofisica Pura e Applicata*, Milan, 44:257–264, Sept./Dec. **1959.** 14 ref. German and English summaries p. 257. **DLC**—The null layer (Nullschicht), identical with the layer of maximum wind in the upper troposphere, inverts the large scale vertical motions in the atmosphere. The lifting motion in a high reaching low pressure system ends in the null layer, whereas ascending motion above the null layer exists—and vice versa in a high pressure system. The null layer is the domain of the maximum of non-gradientic mass flow from low to high pressure (null layer effect). Applied to the theory of the general circulation of the atmosphere the null layer effect explains the mass flow aloft from the polar zones to the subtropic latitudes, demanded by almost all hypotheses of the general circulation. It can be shown that a persistent layer of minimum winds has to be a null layer; a persistent layer of minimum winds represents a null layer of 2nd kind, which inverts the vertical motions too; but in this case the non-gradientic mass flow is directed from high to low pressure. There are evidences for the existence of a null layer of 3rd kind with calm and no mass flow between high and low pressure and no vertical motion. This null layer of third kind separates two atmospheric regions with vertical motions independent from each other. All three kinds of null layers have great importance with regard to the general circulation of the atmosphere. *Subject Headings:* **1. Zero layer effects 2. Atmospheric circulation.**—*Author's summary.*

## VERTICAL MOTION (551.558)

*See also:* **Vertical motion and weather,** 12.3–13; **Synoptic analysis of motion fields** (Fea), 12.3–277.

12.3–361 551.558.1:551.551:551.554:551.555.1

Bunker, Andrew F., **Cloud and environment vertical velocities, temperatures, humidities, and water contents associated with a shear zone in the trade winds.** Woods Hole Oceanographic Institution, Mass., Contract Nonr-1721(00) (NR-082021), (Marine Meteorology), Technical Report, No. 44, Sept. **1959.** 21 p. 10 figs. (incl. photos), 3 tables, 18 refs. **DWB** (M:551.46 W894mt)—Airplane measurements of turbulent and convective vertical velocities of gusts with sizes from 60 m to 6000 m were made during a 160 km flight through a clear area and a cloudy shear zone at a level about 50 m above cloud base. During the straight level flight 19 parcels were cooler than both the shear zone air and the clear air. Some clouds were observed with only downdrafts while others were observed with internal ascending parcels warmer than the cloud air. These and other characteristics substantiate the concept of one type of cumulus cloud as a semi-permanent mass of inactive air with occasional bubbles of buoyant air. The environment is nearly as turbulent as the cloudy air and contains extensive regions of updrafts and downdrafts. At the time of observation an east-west shear zone at 10°N was established by the penetration of a cold front into the North Atlantic Ocean trade winds. North of the shear line, the air was diverging, subsiding, and forming an oval area about 100 km by 200 km which was free of cumulus clouds. The southern boundary of this area was defined by cumulus clouds building up to 2 km. From ship reports of wind velocity it is found that the air in the clear area was subsiding several tenths cm $sec^{-1}$ while the air of the southern wall was ascending faster than 1 cm $sec^{-1}$. The divergence pattern in this area is found to be an extension of a larger pattern covering a part of the North Atlantic Ocean. *Subject Headings:* **1. Trade winds 2. Cloud observations 3. North Atlantic Ocean.**—*Author's abstract.*

12.3–362 536.25:551.558.1

Palm, Enok, **Derivation of the critical Rayleigh number in convection.** *Norske Videnskaps Akademi i Oslo. Institutt for Vaer- og Klimaforskning, Publications and Reports*, No. 3, 1957/1958, issued **1958.** 4 p. 2 refs., 14 eqs. **DWB** (M(055) N863p)—The derivation demonstrated here is based on the application of the circulation theorem which, aside from other advantages, reveals the physics explicitly. *Subject Headings:* **1. Rayleigh number 2. Circulation theorem 3. Convection.**—*W.N.*

12.3–363 536.25:551.558.1

Palm, Enok, **On the tendency toward hexagonal cells in convection.** *Norske Videnskaps-Akademi i Oslo. Institutt for Vaer- og Klimaforskning, Publications and Reports*, No. 5, 1957/1958, issued **1958.** 9 p. 5 refs., 23 eqs. **DWB** (M(055) N863p)—In this preliminary note the effect of non-linear terms and the effect of a viscosity varying with temperature is discussed. It is shown that if the increase of heat supply per second is moderate, hexagons will develop. If the viscosity increases with temperature, the motion will be descending in the middle of the cell, and vice versa, in agreement with the observations. *Subject Heading:* **1. Convection cells.** —*Author's abstract.*

12.3–364 532.5:551.558.21:551.43

Palm, Enok, **On waves produced by a moving corrugation.** *Norske Videnskaps-Akademi i Oslo. Institutt for Vaer- og Klimaforskning, Report*, No. 5, **1952.** fig., 26 eqs. **DWB** (M055 N863p)—A mathematical solution of the problem of waves produced in an infinite fluid which is incompressible, non-viscid with small perturbations in 2-dimensions, with constant static stability. The solution might be applied to the problem of lee waves in an infinite atmosphere by a moving sinusoidal bed. *Subject Headings:* **1. Waves in infinite fluids 2. Fluid mechanics 3. Orographic waves 4. Lee waves.**—*M.R.*

# AQUEOUS VAPOR AND HYDROMETEORS (551.57)

## HUMIDITY (551.571)

*See also:* **Humidity effects on cholera** (McGuire), 12.3–67; **Humidity above stratocumulus clouds** (James), 12.3–321; **Vertical velocities, temperatures, humidities and water contents associated with a shear zone in trade winds** (Bunker), 12.3–361.

12.3–365 551.571.2(47)

Kireeva, N. M.; Kogan, S. Ia. and Kuznetsova, M. A., **Srednesezonnoe raspredelenie plotnosti vodianogo para po vysote dlia territorii SSSR.** [Mid-seasonal distribution of water vapor density with height above the U.S.S.R.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 5:669–672, **1958.** 4 figs., 6 refs., 2 eqs. **DLC.** Transl. into English in the corresponding number of the *Akademiia Nauk SSSR, Bulletin of the Academy of Sciences, USSR, Geophysics Series.* **DLC**—The authors constructed maps of the distribution of water vapor density with altitude for all the seasons over the entire U.S.S.R. on the basis of mean seasonal values of relative humidity and temperature for 57 stations in the U.S.S.R. The water vapor density was computed by means of the formula $\rho_\omega = 0.29 \cdot 10^{-5}(rE(T)/T)$ g/cm$^3$ where $r$ = relative humidity in fractions of one, $T$ = temperature in °C, $E(T)$ = water vapor tension in mm Hg. The mean seasonal values of $\rho_\omega$ were determined by inserting mean seasonal values for $r$ and $T$, but the water vapor tension $E(T)$ for temperatures $0° > T > -16°$C was chosen for water or ice as a function of season and locality. The error arising from the fact that in the formula for $\rho_\omega$ mean values of relative humidity and temperature were used and that $\rho_\omega$ was not averaged after having been calculated for each observation separately, was determined by the formula

$$\delta = A_1 \frac{1}{N} \sum_{i=1}^{N} \left(\frac{r_i - r_m}{r_m}\right)\left(\frac{T_1 - T_m}{T_m}\right) + \frac{A_2}{2}\ \frac{1}{N} \sum_{i=1}^{N} \left(\frac{T_i - T_m}{T_m}\right)^2 + \frac{A_2}{2} \frac{1}{N} \sum_{i=1}^{N} \left(\frac{r_i - r_m}{r_m}\right)\left(\frac{T_i - T_m}{T_m}\right) + \cdots$$

where $A_1 = a(T_m/b + T_m) \ln 10 - 1$, $A_2 = A_1^2 + 1 - 2A_1(T_m/b + T_m)$. The values for the distribution of water vapor density with height for each season are shown on maps. *Subject Headings:* **1. Water vapor distribution 2. Seasonal humidity variations 3. Humidity data.** —*I.L.D.*

12.3–366 551.571.7:551.510.53

Hesstvedt, Eigil, **An analysis of a situation with high relative humidity in the lower stratosphere.** *Norske Videnskaps-Akademi i Oslo. Institutt for Vaer-og Klimaforskning, Report,* No. 3, 1956/**1957.** 10 p. 5 figs., 6 refs. **DWB** (M(055) M866p)—An attempt is made to explain exceptionally high relative humidity in the stratosphere (such as was observed on August 5, 1954), in terms of vertical currents. Surface and upper charts and vertical sections are presented. The study does not, however, include an explanation for the observed sharp drop in humidity between 48,000 and 50,000 ft. *Subject Headings:* **1. Stratospheric humidity 2. Relative humidity distribution.**—*G.T.*

12.3–367 533.4:551.571.71

Palmer, C. Harvey, Jr. (*Laboratory of Astrophysics and Physical Meteorology, Johns Hopkins Univ., Baltimore, Md.*), **Long path water vapor spectra with pressure broadening, Pt. 1, 20μ to 31.7μ.** *Optical Society of America, N. Y., Journal,* 47(11):1024–1028, Nov. **1957.** 7 figs., table, 9 foot-refs. Also: **Pt. 2, 29μ to 40μ.** *Ibid.*, 1028–1031. 7 figs., table, 5 foot-refs. **DWB, DLC**—The meteorologically important 50$\mu$ pure rotation band of water vapor is now being studied experimentally. There has been a measurement of the transmission through a 196-m path under a range of known conditions of water concentrations and of nitrogen pressure. A method for sample analysis and the importance of adsorption effects are indicated in this communication. Pt. 2 covers regions 29$\mu$ to 40$\mu$ under the same conditions as in Pt. 1. The path length is 196 meters and the spectral resolution here is 5 cm$^{-1}$ to 40$\mu$, the slit width being fixed as before. The water vapor partial pressure ranges from 0.015 to 0.6 cm Hg and the nitrogen partial pressures from 0 to 60 cm. *Subject Heading:* **1. Water vapor spectroscopy.**—*Author's abstract.*

## EVAPORATION AND EVAPOTRANSPIRATION (551.573)

12.3–368 551.573:551.511.33

Romanov, V. V., **Raschet ispareniia po uproshchennomu metodu teplovogo balansa.** [Calculation of evaporation by a simplified heat balance method.] *Leningrad. Gosudarstvennyĭ Gidrologicheskiĭ Institut, Trudy,* No. 54:75–79, **1956.** fig., table, 11 refs., 5 eqs. **DLC, DWB**—A simplified method of calculating evaporation from a surface for long periods of time (a month or longer) from an underlying surface is presented. Evaporation is calculated by the equation $U=R_b-Q_s/60\,[1+0.64(\Delta T/\Delta e)]$ where $U$=evaporation in mm/hr; $R_b$=radiation balance of the surface in cal/hr cm$^2$; $Q_s$=heat flow through the soil surface in cal/hr cm$^2$; $\Delta e$=difference between absolute humidity at two surfaces in mb; and $\Delta T$=difference in air temperature at the same heights in °C (hourly mean). The computation based on monthly means of each hour of the day is carried out in the following stages. Total radiation for each hour of the day in case of a cloud free sky is computed $(Q+q)_0{}^n=(Q+q)_0 \sin h^0/\Sigma \sin h^0$ where $(Q+q)_0$=monthly mean of daily total radiation based on tables of Braslavskiĭ and Vikulina; $(Q+q)_0{}^s$=mean monthly values of total radiation for a cloud free sky for a given hour of the day, $\sin h^0$=mean monthly value of the sine of the angle of solar altitude for a given hour. Absorption of radiation, $R_0$, is computed by

$$R_s=(Q+q)_0{}^h\left\{1-h\left[\frac{k_lN_l}{10}+\frac{k_{u+m}(N_0-N_l)}{10}\right]\right\}(1-r)$$

where $N_l$=lower cloudiness in balls, $N_0$=total cloudiness in balls, $h$, $k_l$, $k_{u+m}$=coefficients determined from tables. Effective radiation is computed from the nomograms of E. D. Kovaleva and T. V. Kirillova. The correction, $\Delta u$, for evaporation for the flow of heat in the soil is given by $\Delta N=(-Q_s/Z_m)$; $Q_s$=monthly value of heat flow in the soil and

$$Z_m=\sum_1^{24} 60\left(1+0.64\frac{\Delta T}{\Delta e}\right)\bigg/24.$$

The results of computation are presented in a graph and table. *Subject Headings:* **1. Evaporation calculation theories 2. Heat balance measurement techniques.**—*I.L.D.*

12.3–369 551.573:551.511.33

Struzer, L. R., **K voprosu o tochnosti opredeleniia ispareniia metodom teplovogo balansa.** [Accuracy of the determination of evaporation with the heat balance method.] *Leningrad. Gosudarstvennyĭ Gidrologicheskiĭ, Institut, Trudy*, No. 54:80–91, 1956. 4 figs., 6 tables, 5 refs., 37 eqs. **DLC, DWB**—The accuracy of the method of heat balance for computing evaporation is evaluated by analyzing the random errors depending upon the errors of gradient measurements. In a series of 11 experiments the components $\Delta e$ and $\Delta t$ of the formula

$$E=\frac{B-P}{1+g(\Delta t/\Delta e)}$$

(where $E$=evaporation, $B$=radiation balance of the underlying surface, $P$=flow of heat into the soil, $\Delta t$ and $\Delta e$=temperature and absolute humidity differences between two levels and $g=0.64$ if $\Delta t$ is in degrees centigrade and $\Delta e$ is in mb). This formula can be written $E=xy$, where $x=B-P$ and $y=1/1+0.64(\Delta t/\Delta e)$. The factor $y$ depends only upon $\Delta t$ and $\Delta e$. For each of the 11 series $\bar{y}$ the mean hourly arithmetic value of $\bar{y}$, the mean square deviation $\sigma_0$ and the coefficient of variation $V_0=\sigma_0/\bar{y}$ for $y$. With these values it is possible to find the relationship of relative error $n_y$ upon the probability of $\alpha$ and the frequency of observation $n$. It is shown that $\bar{y}$ has a relatively large variability. The dependence of $\sigma_E$ or $V_E$ in the case of $E=xy$ is analyzed statistically. The accuracy of determination of the mean hourly intensity of evaporation and of the daily and 5-daily totals of evaporation are computed. Random error of evaporation determined by the heat balance method is 1.5–2.5 less than that computed by turbulent diffusion. *Subject Headings:* **1. Evaporation calculation theories 2. Heat balance measurement techniques.**—*I.L.D.*

## CONDENSATION (551.574)

*See also:* **Cloud physics, U.S.S.R.** (Nikandrov), 12.2–14; **Icing of aircraft frequencies** (Perkins), 12.3–48; **Icing of ship,** 12.3–55; **Turbulence effects on coalescence of cloud droplets** (Dingle), 12.3–341; **Fog precip. measurement** (Grunow), 12.3–382; **Dew, mist and rime** (Levert, Scharringa), 12.3–384; **Cloud droplet sampling** (Durbin), 12.3–389.

12.3–370 551.574.1:551.576.11

Jones, R. F. (*Met. Office, London*), **Size-distribution of the ice crystals in cumulonimbus clouds.** *Royal Meteorological Society, Quarterly Journal*, 86(368):187–194, April 1960. 4 figs., table, 4 refs. **DWB, DLC**—Ice-crystal size-distributions have been measured in clouds associated with the intertropical convergence zone and more isolated cumulonimbus clouds in temperate zones. Mean size-distribution fit curves $N_D=1000/D^3$ and $N_D=1000/D^{2.3}$ in tropical and temperate clouds respectively where $N_D\delta D$ is the number per $m^3$ with diameters between $D$ and $D+\delta D$ mm. The tropical curve is a close fit throughout the measured range of $D$ (0.05 to 4 mm) but the temperate curve is applicable in the range up to $D=2$ mm only, thereafter a curve $N_D=10{,}000/D^{5.4}$ fits the curve for $D=2$ to 5 mm. In temperate clouds there is little variability with temperature except for a decrease in size of the largest particles observed as temperature decreases. There is some evidence that the particles caught are graupel of mean density 0.6 g $cm^{-3}$ and on this assumption, variation with total ice-crystal concentration suggests an empirical distribution law for particles with diameters 0.25 mm or greater of $N_D=10^{3.4}\,\mathrm{epx}\left[-\frac{2.67}{W^{\frac{1}{3}}}(D-0.25)\right]$ where $W$ is the ice-crystal content in g $m^{-3}$. *Subject Headings:* **1. Ice crystals size distribution 2. Ice crystals in clouds.**—*Author's summary.*

12.3–371 551.574.1:551.594.25:536.42

Mason, B. J. and Maybank, J. (*both, Imperial College, London*), **The fragmentation and electrification of freezing water drops.** *Royal Meteorological Society, Quarterly Journal*, 86(368):176–186, April 1960. 3 figs., 2 tables, 17 refs., 6 eqs. Comment by C. J. Adkins, p. 186. **DWB, DLC**—The freezing of water drops is often accompanied by shattering of the ice shell and the production of small ice splinters. These phenomena have been studied in relation to the drop diameter in the range 30μ to 1 mm, the nucleation temperature of the drop, the air content and purity of the water. The number of splinters produced is largely governed by the nucleation temperature (the degree of supercooling) which controls the quantity of air released during freezing and is not very dependent on drop size. Slightly supercooled drops of $1/10^{-1}$ mm diameter produced, on average, 20 to 50 splinters. The mechanism of drop fragmentation is discussed and the potential importance of splintering in the ice-nucleus economy of clouds is discussed. Fragmentation of freezing drops is accompanied by electrical charging, usually with the splinters positively charged and the drop residue carrying a negative charge. The magnitude of the residual charge which, on average, is observed to be about $10^{-3}$ e.s.u. for a millimeter drop, is related to the same factors which control splinter production. Charging by this mechanism would not appear to be of major importance in the electrification of thunderstorms. *Subject Headings:* **1. Freezing water drops 2. Electrification of droplets 3. Fragmentation of water drops.**—*Authors' summary.*

12.3–372 551.574.1:551.508.765

Murgatroyd, R. J. and Garrod, M. P. (*Met. Research Flight, Farnborough*), **Observations of precipitation elements in cumulus clouds.** *Royal Meteorological Society, Quarterly Journal,* 86(368):167–175, April **1960.** fig., 3 refs. **DWB, DLC**—Cloud particles of diameters greater than about 100μ can be sampled from an aircraft by exposing within the cloud a thin aluminum-foil surface to the airstream and counting and sizing the indentations made on it. A series of flights has been made through cumulus clouds using this technique with the object of obtaining data on the concentration of these larger particles in clouds of different size and temp. A series of observations showing the measured concentrations is presented and discussed. Concentrations range from less than $1/m^3$ in the smaller cumulus clouds up to 1/liter or more in clouds about 1 km thick. *Subject Headings:* **1. Precipitation elements 2. Cumulus clouds 3. Cloud particles.**—*Authors' summary.*

12.3–373 551.574.11:551.594.1/2

Israël, H., **Condensation nuclei as connecting link for meteorological-electrical relations, Pt. 2.** Germany. Deutscher Wetterdienst Aachen. Meteorologisches Observatorium, Contract AF 61(514)-640, Technical Note No. 11, Nov. 30, **1956.** 30 p. 59 figs., 4 tables, 16 refs., 5 eqs. **DWB** (M94 A111t)—Pt. 1 (see 8.3–251) underlined the importance of the condensation nuclei in the structure and development of the atmospheric electrical process and presented the participation of condensation nuclei at the effect of the atmospheric exchange on the behavior of atmospheric electrical magnitudes by means of some primary results of the character of spot checks from the field of atmospheric electrical aerology. The termination meanwhile of the atmospheric electrical investigations in the Alps provided an especially favorable occasion for a closer study of this exchange effect under most differing climatic and meteorological conditions in different altitudes. These experiences and the comparison with other measuring places are reported in the following, which allows to draw the conclusion of a double effectiveness of the condensation nuclei in the meteorological-electrical context. *Subject Headings:* **1. Condensation nuclei 2. Atmospheric electrical aerology.**—*Author's abstract.*

12.3–374 551.574.41

Venkiteshwaran, S. P. and Venkataraman, R. (*both, Met. Office, Poona*), **Measurement of dew at the Central Agricultural Meteorological Observatory, Poona.** *Indian Journal of Meteorology and Geophysics,* Delhi, 9(4):363–370, Oct. **1958.** 5 figs., table, 2 refs. **DWB, DLC**—Ramdas and Katti (1934) have shown how the soil absorbs and gives up water vapor from the atmosphere in the dry season. During the day, the soil dries out readily, but at night it is able to absorb large amounts of water from the air layer resting upon it. They have estimated the average water content of the soil to be 7.8 per cent in the morning and this goes down to nearly 3.8 per cent in the afternoon. This process of absorption by the soil surface has been designated as "invisible condensation" to distinguish it from the well known phenomenon of dew. During the afternoon and night, when invisible condensation is in progress, the vapor pressure naturally increases with height, indicating a downward flow of moisture towards the ground. During the earlier part of the day, when moisture is being lost by the soil, the vapor pressure decreases with height indicating an upward flow of moisture from the surface of the ground. Besides "invisible condensation," which sets a limit to the continuous lows of moisture from the ground, during clear calm nights, the surfaces of the ground and of objects near the ground which are exposed to the sky as well as the air layers near the ground, lose heat as a result of radiation exchange. When the cooling is sufficient to bring down the temperature below the saturation temperature of the air which surrounds them, water condenses and deposits on them as dew. It is a form of precipitation that cannot be measured with the raingauge and is one of the important sources of moisture to the soil in plant growth during times of drought and in arid or semi-arid regions. Dew is also responsible for the spread of many plant diseases. *Subject Headings:* **1. Dew formation 2. Poona, India.**—*Authors' abstract.*

12.3–375 551.574.42

Aleksandrova, A. G., **O vertikal'noĭ stratifikatsii atmosfery pri gololede.** [Lapse rate during glaze.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy,* No. 75:78–81, **1957.** 4 figs., table, ref. **DLC**—The results of an analysis of 100 radiosonde ascents made in Voronezh and Kursk during the period 1937–1948 on days with glaze. Analysis of thermodynamic diagrams and synoptic maps during glaze occurrence has shown that in most cases glaze represents frontal phenomena; the probability of intramass glaze constituted 5%. The specific humidity during glaze occurrence along a frontal zone fluctuated between 1.2 and 5.9 g/kg. The mass glaze stratification curve was entirely within the region of negative temperatures; the stratification curve corresponding to maximum temperatures during glaze in the lower layers up to the isobaric surface of 660 mb was in the temperature above region 0°C; but the probability with cases above 0°C was 16%. The maximum temperature in the frontal zone during glaze attained 6°C and the minimum −11.5°C. The minimum temperature boundary corresponds approximately to the maximum difference of water vapor tension over water and ice. A detailed description with the aid of graphs is given of the glaze stratification curve and the characteristics of vertical stratification for which ice deposits greater than 5 mm and those interfering with the operation of transmission lines are examined. A table giving the probability of formation of glaze at different air temperatures is presented. *Subject Headings:* **1. Glaze data 2. Glaze formation 3. Lapse rate during glaze.**—*I.L.D.*

12.3–376 551.574.42

Drozdov, O. A. and Rudneva, A. V., **K voprosu ob izmenenii intensivnosti otlozheniia gololeda na provodakh s vysotoĭ.** [Problem of variations with height in the intensity of glaze deposition on wires.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy,* 57(119): 80–87, **1956.** 8 figs., 9 refs., 4 eqs. **DLC**—The laws underlying the variation with height in the intensity of ice depositions upon conductors was investigated on the basis of instrumental observations on icing at varying heights carried out at different stations in the USSR. The deposition of glaze and rime increases with increasing height of the conductor above the ground surface, and with increasing height the intensity of glaze deposition increases proportionately to the square of the wind velocity. In addition to the influence of wind velocity upon intensity of glaze deposition, the following factors play a role: water content of fog drops; the microstructure of fogs and the duration of the process of glaze formation. The equation $D=\alpha WVt$ for determining the variation, the intensity of glaze deposition with height is developed. The evaluation of the parameters of this formula is considered and its validity is tested in comparison to observational data. Its generally satisfactory character is pointed out. *Subject Headings:* **1. Glaze distribution with height 2. Glaze intensities.**—*I.L.D.*

12.3–377 551.574.42

Hatakeyama, H. (*Tokyo District Met. Obs.*) and Nemoto, S. (*Met. Research Inst., Tokyo*), **A note on the formation of horizontal stripes on icicle.** *Geophysical Magazine,* Tokyo, 28(4): 479–484, Sept. **1958.** 7 figs., (incl. photos), table. **DWB, DLC**—We made a close observation of horizontal stripes of the icicle in a field and in a low temperature laboratory. The growth of icicles is influenced by the quantity of water which flows down along the surface of icicle and the surface temperature of the icicle. In the very early stage of development, the icicle already has uneven thickness which is preserved and exaggerated in the following stage of development, because the water film flowing down along the surface of the icicle is easier to freeze on the convex part than on the concave part. The pitch of the stripe on the icicle is about 9 mm or somewhat larger. This has a close correlation with the dimension of the pendent water drop on the tip of icicle. *Subject Heading:* **1. Icicle formation.**—*Author's abstract.*

12.3–378 **551.574.42**

Zamorskii, A. D., **Vertikal'nyĭ gradient chastoty obledeneniia.** [The vertical gradient of the frequency of hoar frost.] *Vsesoiuznoe Geograficheskoe Obshchestvo, Leningrad, Izvestiia,* 90(3):285–288, **1958.** 9 tables, 6 refs. **DLC**—The frequency of hoar frost increases with the relative height of the hoar frost receiver above the surrounding surface of the earth as is evident from the fact that the amount and frequency of hoar frost deposits increase as the height of the suspension of wires increases; and the higher meteorological stations are situated above their surroundings the more frequent and the greater is the amount of hoar frost and rime. The physical reasons for this phenomenon are the fact that rime and hoar frost are produced by supercooled rain or drizzle which are best developed at some elevation above the earth's surface and by the increased wind velocity with height. The effect of altitude upon frequency and intensity of hoar frost is illustrated by numerical data giving relative frequency of hoar frost for stations in Georgia (U.S.S.R.), the Central Russian elevation, the Eastern Don ridge, the southern Volyno-Podol'sk elevation, the Pri-Dnieper elevation, the Donets mountain range, Crimea, etc. *Subject Headings:* **1. Hoar frost frequencies 2. Altitude effects on hoar frost.**—*I.L.D.*

12.3–379 **551.574.7:551.508.822:551.509.324.3**

Alt, J., **Détermination des zones de givrage à l'aide des radiosondages.** [Determination of icing zones by radiosoundings.] *France. Météorologie Nationale, Notice d'Instructions Techniques, Section 12,* No. 2, June **1957.** 16 p. 8 figs., table, 3 refs., eqs. Mimeo.—A general discussion of icing problems: surfusion, dew point and frost point. It describes the methods for the determination of icing zones, and elaborates the method of A. C. Best, based on the fact that the intensity of icing is a function of the quantity of condensed water existing in clouds. *Subject Headings:* **1. Icing zones 2. Determination methods.**—*A.V.*

12.3–380 **551.574.7:551.508.822**

Kitaoka, T.; Ooi, S. and Igarashi, T., **Experiments on the icing of radiosonde.** *Tateno, Japan. Aerological Observatory, Journal,* 6(2):73–76, Feb. **1958.** 9 figs. In Japanese; English summary p. 73. **DLC**—By icing of radiosonde, errors may occur on measured values of temperature and humidity. Experiments were carried out on the summit of Mt. Fuji, from November 1952 to May 1953 as shown in Table 1. Radiosonde was exposed in the wind of about −10°C and 5 m/s, and the icing on bimetal and hair was inspected and photographed. A wire, put on the upstream, decreased the icing, and a net avoided the icing. Icing showed an error of 0.3–1.2°C, and solar radiation showed an error of a few degrees. This experiment was suspended due to financial reasons. *Subject Headings:* **1. Icing of radiosondes 2. Radiosonde errors.**—*Authors' summary.*

12.3–381 **551.574.7:551.576.1**

Perkins, Porter J. (*Lewis Research Center, Cleveland*), **Summary of statistical icing cloud data measured over United States and North Atlantic, Pacific, and Arctic oceans during routing aircraft operations.** *U. S. National Aeronautics and Space Administration, NASA Memorandum,* 1-19-54E, January **1959.** 89 p. 17 figs., 2 tables, 9 refs., 4 eqs. **DWB, DLC**—An extensive program was conducted to obtain icing-cloud statistics needed in aircraft design and operation. The data were collected during routine flights of airline and United States Air Force aircraft. Pressure-sensitive icing meters were installed on 72 service aircraft flown by several different cooperating organizations along domestic and overseas airways and over wide areas of the Pacific and Arctic oceans. The results of this survey are summarized in tabular form and as frequency distributions of the measured icing-cloud parameters. Distributions are given for cloud liquid-water content, distance traveled in icing, depth of an icing-cloud layer, temperature of icing clouds, and a reference measure of the total ice accretion (thickness) resulting from over-all exposure to the cloud system. Data were received from 3200 icing-cloud encounters recorded over several icing seasons. Statistical presentation of these data required defining a unit of cloud system length, particularly for conditions of intermittent icing produced by broken clouds. A unit icing encounter, frequently containing several separate periods of icing, was established when a period of no ice accretion exceeded 10 minutes. The distance traveled within icing clouds, when accumulated for an encounter, exceeded 56 miles in 10 percent of the encounters. The distribution of liquid-water content, averaged over short distances (1-min intervals of flight), showed a mean of 0.25 gram per cubic meter with values under 0.6 gram per cubic meter existing 90 percent of the time. These cloud water contents were about two-thirds of those calculated from adiabatic lifting theory using the measured cloud depths and temperature data. The distribution of icing temperatures showed that clouds colder than −20°C existed in 10 percent of the encounters. *Subject Headings:* **1. Icing data, North America 2. Icing in clouds 3. Icing meters 4. North America.** —*Author's summary.*

## FOG (551.575)

*See also:* **River effects on winter fogs** (Bashkirova, Krasikov), 12.3–431.

12.3–382 551.575.1:551.574.41

Grunow, Johannes (*Met. Obs., Hohenpeissenberg des Deutschen Wetterdienstes*), **Vergleichende Messungen des Nebelniederschlags.** [Comparative measurements of fog precipitation.] *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Toronto, Sept. 1957,* [*Transactions*], Vol. 2, pub. **1958.** p. 485–501. 2 figs., table, 19 refs. English summary p. 485. **DWB** (M(06) 1611g)—Results of some years' comparable measurements of fog precipitation with the Hohenpeissenberg fog catcher are discussed. In addition to cloud physical conditions the exposition and height of locality is decisive for the amount of deposits from cloud air. The highest amounts are given in case of including warm air masses of maritime origin drift. The droplet spectrum then indicates a range of 4 to 20$\mu$ and a maximal diameter of 8–12$\mu$. The deposits are still more intensive with amounts of 2–3 mm/h in case of stemming cloudiness when rain is not actual. The air masses are then often degenerated by continental influence and the droplet spectrum indicates a wide range from 5 to 60$\mu$ with a maximum of 12–18$\mu$. On the tops of the German upland mountains there is found a surplus of 1–2 times of precipitation amount in a year. It is compared with the amount of water deposited by fog precipitation on the Velebit (Jugoslavia), on Table Mountain (South Africa) and on Hokkaido (Japan). *Subject Headings:* **1. Fog precipitation measurements 2. Hohenpeissenberg, Germany.**—*Author's abstract.*

12.3–383 551.501774:551.575(262)

*Kirigin, Božidar, **Beitrag zum Problem der Nebelniederschlagsmessungen.** [Problem of fog precipitation measurement.] *Germany. Deutscher Wetterdienst, Berichte,* 8(54):96–105, **1959.** 7 figs., 11 tables, 9 refs. German, English and French summaries p. 96. **DWB, DLC**—In order to get a conception as complete as possible of the amount of fog precipitation, beside the effects of continentality and of slope, which are investigated, it appears necessary to explain in detail the cases of the fog effects close to the coast. Based on the series of observations from the Mediterranean area at the mountain station Zavižan at 1620 m NN (mountain Velebit) and which is situated next to the Adria coast, the measurements in cases of fog deposits with or without precipitation dependent on wind force and determined weather types are described. *Subject Headings:* **1. Fog precipitation 2. Zavizan Mt., Yugoslavia.**—*Author's abstract.*

12.3–384 551.575 551.574.4 551.508.79

Levert, C. and Scharringa, M., **De zware mist en ruige vorst in februari 1959.** [Dense fog and hard rime in February 1959.] *Hemel en Dampkring,* The Hague, 57(5):113–120, May **1959.** 6 photos, table. **DWB, DLC**—The author gives a description of dew, mist, fog, hoarfrost, soft rime, hard rime and glazed frost and outlines their significance in water. The meteorological circumstances of the persistant period of fog and hard time for Feb. 5–14, 1959 over West Europe are given. The two methods used at De Bilt for measuring the amount of hoarfrost on a good-sized beech are described, and the results of these measurements are mentioned. Nine rain gages put under the beech gave an average of 8.8 mm in 7 days. The chemical composition of samples of hard rime taken at De Bilt is given. *Subject Headings:* **1. Condensation and deposits 2. Fog and hard rime 3. Instruments for measuring hydrometeors 4. Netherlands.**—*A.V.*

12.3–385 551.**575.1**:551.**511.33**(433)

*†Kraus, Helmut, **Untersuchungen über den nächtlichen Energietransport und Energiehaushalt in der bodennähen Luftschicht bei der Bildung von Strahlungsnebeln.** [Investigations on the nocturnal energy transport and regime in the air layer near the ground during the formation of radiation fog.] *Germany. Deutscher Wetterdienst, Berichte,* 7(48), **1958.** 25 p. 9 figs., 10 tables (fold.), 30 refs., 41 eqs. English summary p. 4. **DWB, DLC**—In this investigation of the physical processes involved in the formation and dissipation of ground fog the author attempts to arrive at an explanation of these processes on the basis of the energy flexes, which are active in the layer near the ground and which can be determined from the energy balance equation as functions of height and time. On a denuded area in the Perlacher Forest near Munich, ground fog up to some meters in height forms on nearly every calm and cloudless night. On this clearing the vertical distribution of net radiation, temperature, humidity and wind velocity was measured in seven calm autumn nights from before sunset until after sunrise. The results of this field investigation and the divergence of net radiation computed by means of the tabular method of D. L. BROOKS (*J. Meteorology,* 7:313–321, **1950**) constitute the basis for calculating the radiation balance by means of the energy balance equation of an atmospheric layer. It is shown that there are three energy causes for the formation of ground fog. They seldom become effective alone. They are as follows: (1) the atmospheric layer loses heat by radiation; (2) the atmospheric layer loses heat by turbulent exchange and (3) the atmospheric layer gains water vapor by turbulent exchange. The direct cause of ground fog formation is not radiation alone. Turbulent exchange is very effective in cooling the layer in which the fog forms, so that the exchange coefficient plays an important role. The contents of this paper include a theoretical review of energy balance, a description of the measurement of the profiles of radiation balance, temperature, humidity and wind speed including the experimental plot, instrumentation, organization of the micrometeorological station: description of the water situation and their nocturnal course; the results of measurements and the computation of the energy balance from the measurements by the method of D. L. BROOKS, H. LETTAU, O. G. SUTTON, H. SVERDROP; the actual computation procedure; the general causes of fog formation during sunrise; and comments on the work of R. G. FLEAGLE and F. K. DAVIS on fog formation. *Subject Headings:* **1. Radiation fog 2. Energy transport 3. Munich, Germany.**—*I.L.D.*

12.3–386 551.**575.1**:551.**524.3**:551.**576.11**(64)

§Pecquais, C., **Les stratus et brouillards de refroidissement à Meknès.** [Stratus and fogs at Meknes due to cooling.] *France. Météorologie Nationale, Notice d'Instructions Techniques.* Section 14, No. 9, March **1958.** 19 p., 9 figs. Mimeo.—After giving some geographical particulars of Northern Morocco, author investigates thermal phenomena in the Rharb. These cause the forming of a small atmospheric depression determining direction of prevailing winds following cyclonic rotation. A description is given of the foggy formations at Meknes due to an adiabatic cooling, cool and humid air heaving on a slope, followed by a cooling caused by nocturnal radiation. In that region two types of fog can be distinguished; advection-radiation fogs and stratus, and orographic stratus. Analysis of numerous synoptic situations has shown that two types of weather are particularly propitious for the formation of stratus and fogs at Meknès: a) a stable ridge over the Near-Atlantic at the latitude of the Iberian Peninsula, with a very attenuated cold front off the Moroccan coasts; b) a pronounced Saharian trough with feeble isobaric gradient over Morocco and the Iberian Peninsula. *Subject Headings:* **1. Stratus formation 2. Fog formation 3. Adiabatic cooling 4. Meknès, Morocco.** —*A.V.*

## CLOUDS (551.576)

*See also:* **Cloud observation at night** (Takács, Zách), 12.3–227; **Cloud height measurement** (Früngel), 12.3–236; **Cloud effects on momentum transfer** (Scorer), 12.3–273; **Absorption by clouds** (MacDonald), 12.3–310; **Temp. and humidity near stratocumulus clouds** (James), 12.3–321; **Turbulence effects on coalescence of cloud droplets** (Dingle), 12.3–341; **Cloud and environment vertical velocities, temperatures, humidities and water content in trade winds** (Bunker), 12.3–361; **Distribution of ice crystals in cumulonimbus** (Jones), 12.3–370; **Precipitation elements in cumulus** (Murgatroyd, Garrod), 12.3–372; **Icing cloud data, U. S., Atlantic, Pacific and Arctic oceans** (Perkins), 12.3–381.

12.3–387 551.576.11(494)

Jefferson, C. J., **Banner cloud over the Matterhorn.** *Meteorological Magazine*, London, 88(1048):311–312, Nov. **1959.** 2 photos. **DWB, DLC**—Two photographs are presented and discussed to illustrate the formation of a banner cloud on the Matterhorn, the wedge shaped peak of over 14,000 ft in southern Switzerland. The uplift of air flowing over it becomes visible when the relative humidity is large enough to allow condensation to take place. The appearance of the banner cloud and its subsequent changes in size and form clearly indicate changes in humidity in the middle troposphere (12,000 to 14,000 feet). The two photographs are described. One was taken on 20 Feb. 1959 from a height of 8000 feet in the mountains above Zermat, Switzerland, looking south-west and the other was taken the next day from a height of 6000 feet near Zermat, Switzerland, looking south-south-west. An examination of the synoptic situation is presented and the changes in relative humidity during the 5 days (19–23 Feb.) observed at Payerne, the nearest radio-sonde station, are reported. The increase in relative humidity during the period of appearance and increasing size of the banner cloud and the decrease accompanying its disappearance is evident. *Subject Headings:* **1. Banner clouds 2. Matterhorn, Switzerland.**—*I.S.*

12.3–388 551.576.11

Jones, R. F. (*British Met. Office*), **Water and ice in the atmosphere.** *Royal Aeronautical Society, London, Journal*, 63(584):465–473, Aug. **1959.** 11 figs., 10 refs. **DWB, DLC (JL501.R7)**—This paper has carefully explained the complexities of cloud physics and why questions on the water and ice crystal contents of clouds and the size distribution of raindrops and many other related subjects which cannot always be answered with precision. The discussion covers the characteristics of water in the liquid form, supercooled water, size distribution of water droplets, the water content of super-cooled clouds, ice crystals, hail, total ice and water content of some tropical clouds as well as raindrops, all of which are found in the atmosphere. *Subject Heading:* **1. Cloud physics.**—*N.N.*

12.3–389 551.576.11:551.574.1

Durbin, W. G. (*Met. Res. Flight, Farnborough, Hants.*), **Droplet sampling in cumulus clouds.** *Tellus*, Stockholm, 11(2):202–215, May **1959.** 7 figs., 3 tables, 9 refs. **DWB, DLC**—An analysis is made of 150 cloud droplet samples obtained by the impaction method in cumulus clouds varying in vertical depth from 750 to 7000 ft. From a consideration of the spectra relating numbers of droplets with droplet diameter, a mode diameter of about $8\mu$ is found. A secondary mode diameter of about $15\mu$ is in evidence in some clouds. In the main numbers of droplets are between 100 and 300 per cm$^3$ but extreme values of about 20 and 1000 occur. Spectra relating water content with droplet diameter show that in clouds between about 750 and 2500 ft thick the mode diameter is about $8\mu$, whereas in cloud between about 4000 and 7000 ft thick the mode diameter is about $18\mu$. The highest value of water content found is about 5 g m$^{-3}$. Evidence is found that mean volume diameter tends to increase with height above cloud base and that high values of water content are due to larger droplets rather than to greater numbers of droplets per cm$^3$. A droplet distribution formula given by Best is examined and the constants involved are found to depend on the largest size of droplet present. *Subject Headings:* **1. Cloud droplets sampling 2. Cumulus clouds 3. Cloud droplet diameter.** —*Author's abstract.*

12.3–390 551.576.12

Khromov, S. P., **O sovremennykh klassifikatsiiakh oblakov.** [Contemporary cloud classifications.] *Meteorologiia i Gidrologiia*, Leningrad, No. 8:43–46, Aug. **1959. DWB, DLC**—The author presents a detailed comparison between the new international cloud classification system underlying the "International Cloud Atlas" published in 1958 and the new classification system developed by the Central Aerological Observatory of the U.S.S.R. and the extent to which both schemes differ from the "International Cloud Atlas" of 1929 1932. Both Atlases divide the clouds of the troposphere into 10 classes but they differ in terminology. The new international cloud atlas speaks of genera while the Soviet Atlas speaks of forms. Both atlases contain the terms species and varieties. In the new international atlas the classification by layers is outside the classification system; in the Soviet Atlas it is an initial step of classification. In the Soviet Atlas the subdivision of layers is based upon the cloud base while in the new International Atlas the subdivision of layers is based upon the entire cloud. The classification of cloud layers, the nomenclature, subsidiary classification, in both systems are compared. *Subject Heading:* **1. Cloud classification.**—*I.L.D.*

12.3–391 551.576.2:551.521.32

Gal'perin, B. M. and Kuchumova, L. S., **O vliianii oblachnosti na izluchenie atmosfery.** [Effect of cloudiness on atmospheric radiation.] *Meteorologiia i Gidrologiia*, Leningrad, No. 8:19–24, Aug. **1959.** 6 figs., table, 14 refs., eq. **DWB, DLC**—In climatological computations of long wave radiation the influence of cloudiness is computed by the formulas

$$\pi_n = \pi_0(1 + Kn^{\alpha}) \quad \text{and} \quad E_n = E_0(1 - \mathrm{C}_n{}^{\alpha})$$

where $\pi_n$ = atmospheric radiation, $E_n$ = effective black body radiation (for given air temperature) in the presence of cloudiness; $\pi_0$ and $E_0$ = the above values in the absence of clouds; $n$ = cloudiness in fractions of one, and $K$ and $C$ = coefficients characterizing the effect of different clouds on atmosphere and effective radiation, $\alpha > 1$, i.e., the dependence of atmosphere and effective radiation upon cloudiness is nonlinear. In this paper the authors attempt to determine the value of $K$ for cloudiness at different altitudes under any meteorological condition since the connection to atmospheric radiation has more physical meaning. The atmospheric radiation for a cloud free sky ($\pi_0$) and for a completely cloudy sky ($\pi_n$) at elevations of 0.5, 1.0, 2.0 and 4.0 km were computed for 23 points lying between 21° and 78° north latitude. $K$ was determined from $(\pi_n - \pi_0)/\pi_0$ for all months of the year and for Jan., April, July and Oct. for most of the foreign stations. With the aid of graphs, the authors discuss the annual variation of atmospheric radiation for a cloud free sky, the dependence of $\pi_n - \pi_0$ upon effective absorption by air masses for different temperatures of a cloud free layer, the annual variation of $K$, and its dependence upon the coefficient of absorption of air masses and upon atmospheric moisture at the surface. *Subject Headings:* **1. Atmospheric radiation 2. Cloudiness effects on radiation 3. Long wave radiation.**—*I.L.D.*

12.3–392 551.576.31(498.11)

Baroncea, E. and Neacşa, O., **Variaţia diurnă nebulozitătii totale şi a frecventei formelor de nori inferiori la Bucureşti.** [Daily variation of the total nebulosity and of the frequency of low cloud forms at Bucharest.] *Meteorologia, Hidrologia şi Gospodarirea Apelor*, Bucharest, 4(1):11–16, **1959.** 3 figs., table, Russian, French, and English summaries p. 77–79. **DWB**—The daily variations of cloudiness at Bucharest during the four seasons are accompanied by the daily frequency variations of the typical cloud forms. Correlating the characteristical phases in the daily development and the predominant clouds, the authors point out the main processes which lead to the formation of clouds and which determine the variation for every season. *Subject Headings:* **1. Cloudiness variations 2. Cloud formation 3. Cloud frequency variations.** —*Authors' abstract.*

12.3–393 551.576.36:551.577.38:551.509.617(54)

Satakopan, V. and Sen, B. K. (*Met. Off., New Delhi*), **Distribution of dry cloudy days in India.** (In: Symposium on Artificial Rain, New Delhi, Feb. 1953, **Proceedings and Papers,** pub. **1955.** p. 112–120. 9 figs., 3 tables.) **DWB**—The paper seeks to provide information about seasons and regions which get abundance of clouds but give no rain. Three alternative criteria have been adopted to distinguish a cloudy day for the purpose of this paper: (1) A day with all cloud about seven-tenths and over, (2) a day with low clouds four-tenths and over and (3) a day with low cloud seven-tenths and over. From the average number of cloudy days according to each of the above criteria in each month, the average number of days with rain 0.01 in. or more have been subtracted and the remainder has been taken as the average number of dry cloudy days for that month for that station. The number of dry cloudy days derived as above for all observatories have been plotted on maps for twelve months and for the year as a whole. The resulting frequencies have been plotted on three sets of maps corresponding to the three criteria used for defining a cloudy day, and isolines have been drawn and the seasonal and regional distribution of cloudy days without rain indicated. It would appear that the areas in India where maximum opportunities could be had for rain-making experiments are: Saurashtra and Cutch, Gujarat, Hyderabad, Mysore, Coastal Andhra Desa, Rayalaseema, Tamilnad, Eastern parts of Orissa and a few stations in Assam. *Subject Headings:* **1. Cloud frequencies without rain 2. Cloud seeding 3. India.**—*Authors' abstract.*

12.3–394 551.**576.5**

Schneider, Bernard, **Nuages d'onde sur le terrain d'Aspres-sur-Buech.** [Wave clouds over the Aspres-sur-Buech airfield.] *Les Ailes*, Paris, 38(1706):14, Dec. 6, **1958.** 3 photos. **DLC**—Three typical photographs of the sky taken by the author at the airfield. The first photo shows stationary wave clouds and moving cumulus with N-wind. The second photo taken on the same day from the south shows a "rotor" and cumulus fractus. The third photo shows wave clouds with N-wind. *Subject Headings:* **1. Wave clouds 2. Aspres-sur-Buech, France.**—*A.V.*

## PRECIPITATION (551.577)

*See also:* **Max. possible precip.,** 12.3–12; **Precip. data, N. Hemisphere** (Sokhrina), 12.3–17; **Graphical precip. forecasting** (Brandejs, Zikmunda), 12.3–243; **Objective precip. forecasting** (De Fina, Sabella), 12.3–251; **Precip. anomalies** (Ponomarenko), 12.3–286; **Effect of Great Lakes on pressure** (Petterssen, Calabrese), 12.3–331; **Cloud frequencies without rain** (Satakopan, Sen), 12.3–393; **Precip. variations** (Portig), 12.3–423.

12.3–395 551.**577.2/3**(549) 551.**577.32**:523.746(549)

†*Naqvi, S. N. (*Met. Service, Government of Pakistan*), **Periodic variations in water balance in an arid region—a preliminary study of 100 years' rainfall at Karachi.** *UNESCO, Arid Zone Research*, 11:326–345, pub. **1958.** 8 figs., 8 tables, 21 refs. French summary p. 345. **DWB** (M84 US8cl)—Rainfall data for Karachi (1856–1955) are tabulated (monthly and annual values of average and highest total rainfall, heaviest 24-hour rainfall, number of rainy days, length of spells with wet weather, etc.), and analyzed as a frequency and periodicity. Of the average 7.75 in. annual rainfall 6.16 in. occur in the monsoon season (4.97 in. in July and August). Precipitation for the whole year does not show any periodicities, but July precipitation shows a periodicity of 3–5 years and one of 10–13 years. July precipitation amounts are compared with Wolf's sunspot numbers for each year of the 100 year period. Smaller rainfall periodicities (7, 8, 10, 11, 21 and 45 months) are also identified. *Subject Headings:* **1. Seasonal precipitation distribution 2. Annual precipitation variations 3. Sunspot effects on precipitation 4. Karachi, Pakistan.**—*G.T.*

12.3–396 551.**577.21**:519.241.1(73)

McDonald, James E. and Green, Christine R. (*both, Univ. of Arizona, Tucson, Arizona*), **A comparison of rank-difference and product moment correlation of precipitation data.** *Journal of Geophysical Research*, Wash., D. C., 65(1):333–336, Jan. **1960.** table, 8 refs., 3 eqs. **DWB, DLC**—A large sample (4650 cases) of comparisons of the Spearman rank-difference correlation coefficient $r'$ and the Pearson product-moment correlation coefficient $r$ is presented. The correlation data are 50-year records of winter and summer half-year precipitation totals for 220 stations, well distributed throughout the United States. The agreement between corresponding values of $r'$ and $r$ is very close; about 72% of all cases differ by less than one-half the standard error of $r$, and about 94% differ by less than one standard error of $r$. It is concluded that the distributions of $r'$ and $r$ are so close that for most geophysical correlation applications $r'$ is as adequate a statistic as $r$, and in certain cited cases is preferable to $r$; hence $r'$ deserves much wider use in climatology and hydrology than it has received in the past. *Subject Headings:* **1. Correlation coefficients 2. Seasonal precipitation distribution 3. United States.** –*Authors' abstract.*

12.3–397 551.**577.3**:551.**524.3**:551.**525.4**(52)

Frolow, Vladimir (*Paris*), **On the annual components computed with the normal monthly values of precipitation and temperature in Japan.** *Journal of Meteorological Research*, Tokyo, 11(4):269–272, April **1959.** fig., 3 refs., eq. In Japanese; English summary p. 269. **DWB, DLC**—The author computed the phases of the annual components of precip., air temp. and earth temp. (at 1-m depth) from the normal monthly values at 71 weather stations in Japan published by G. N. VITVITSKIĬ, the method of computation following the scheme given by K. P. IAKOVLEV. The areal distributions of phases represented with fractions of annual period in percentages are shown in Fig. 1, and some relations are pointed out for the land and sea distributions and topography in Japan. *Subject Headings:* **1. Precipitation variations 2. Temperature variations 3. Japan.**—*Author's abstract.*

12.3–398 551.**577.32**(77)

*Landsberg, H. E. (*U. S. W. B., Wash., D. C.*), **Some patterns of rainfall in the North-Central U. S. A.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, Vienna, 10(2):165–174, **1960.** 4 figs., 4 tables, 15 refs. English, German and French summaries p. 165. **DWB, DLC**—Weekly statistics of rainfall occurrence in the North-Central United States show certain preferences for precipitation in early April and early June. Dry spells are most common in late October, mid-November, mid-December and at the end of the year. A northward migration of the rainy condition in spring and early summer is linked with a comparable motion of the jet stream. The possible connection of these spells with "singularities" elsewhere and BOWEN'ş rain statistics is discussed but no firm relations can be established. *Subject Headings:* **1. Rainfall patterns 2. Bowen's rain statistics 3. Rainfall frequency distribution 4. North Central U. S.**—*Author's summary.*

12.3–399 551.**577.32**(52):551.**513**:551.**509.54.2**

*Sugaya, S. (*comp.*), **On the ending of Bai-u of 1957 from the view-point of 5-day mean 500 mb chart.** *Journal of Meteorological Research*, Tokyo, 11(4):280–344, April **1959.** 62 figs., 8 tables. In Japanese. Also Hiyama, K. (*comp.*), **Investigation on the forecasting of the ending of Bai-u.** *Ibid.*, 39 figs., 4 tables, 13 refs. In Japanese. Also Yagi, H., **Forecasting the period of heavy rainfall in Bai-u season.** *Ibid.*, 9 figs., 2 tables, 2 refs. In Japanese. English summary for all three articles p. 279. **DWB, DLC**—On the 11th and 12th of March 1958, a meeting of forecasters from all parts of Japan was held to discuss the problems of forecasting the ending of Bai-u season (summer rainy season in Japan) and a heavy rainy period in this season. In Pt. 1 the characteristics of the pattern in 5-day mean chart and the anomaly distribution chart of 500 mb level at the former and latter stages and the ending of Bai-u season were mainly discussed. It was made clear that in many cases the ending of Bai-u was caused by the eastward moving ridge from the continent or by the westward extending ridge from the Pacific Ocean to Japan, and it could be forecast by the tracking of anomaly high on anomaly distribution chart and of ridge in continuity chart. In Pt. 2 the discussion was made on the relation between the ending of Bai-u season and various elements as follows: (1) 500 mb height and its anomaly, the change of zonal index around Aleutian Islands or the Bering Sea, (2) mean temp. of June in the northern Japan, etc. In Pt. 3 the development of westerly trough in the Far East in order to forecast the heavy rainy period in Bai-u season was discussed. *Subject Headings:* **1. Bai-u, Japan (1957) 2. Bai-u rainfall forecasting 3. Japan.**—*Author's summary.*

12.3–400 551.**577.36**(492)

de Boer, H. J. (*Royal Netherl. Met. Inst., DeBilt*), **On the cumulative frequency distributions of $k$-day period amounts of precipitation for any station in the Netherlands, while $k \geqq 30$.**

*Archiv fur Meteorologie, Geophysik und Bioklimatologie, Ser. B*, Vienna, 9(2):244–253, **1958.** fig., 3 tables, 4 refs., 4 eqs. English, German and French summaries p. 244–245. **DWB, DLC**—A simple method of representing cumulative frequency distributions of *k*-day period amounts of precipitation ($30 \leqq k \leqq 1800$), deduced from observations at Hoofddorp during 87 years and from observations at Winterswijk during 73 years, by means of cumulative Poisson distributions, had been developed. Poisson's constant $\alpha$ appeared to depend linearly on *k* only, while the Poisson unit q appeared to be only proportional to the annual variation. In this paper it is shown that the representation of observed cumulative frequency distributions with the aid of Poisson distributions is true for any station in the Netherlands in the interval $30 \leqq k \leqq 1800$. A map with isopleths of $\alpha$-values for $k = 360$ presents a simple picture, so that for any station an $\alpha$-value for $k = 360$ can be estimated. For the process of representation the mean *k*-day period amount of precipitation is also necessary. This value may be obtained from a map for each of the 12 months, each map covered with isohyetal lines, which give a distribution of the monthly precipitation. *Subject Headings:* **1. Rainfall frequency distribution 2. Netherlands.** —*Author's abstract.*

12.3–401 **551.577.35:551.557**

Srinivasan, V. (*Met. Office Calcutta*), **Southwest monsoon rainfall in Gangetic West Bengal and its association with upper air flow patterns.** *Indian Journal of Meteorology and Geophysics*, New Delhi, 11(1):5–18, Jan. **1960.** 6 figs., 5 tables, 8 refs., eq. **Comment** by J. M. Korkhao and **Reply** by Srinivasan. *Ibid.*, 11(4):418-420, Oct. **1960.** fig., 5 refs. **DWB, DLC**—The day-to-day occurrence of rainfall over Gangetic West Bengal during three monsoon seasons was studied in the light of the upper air flow patterns and it was noticed that the rainfall occurs mostly due to the divergence ahead of upper easterly waves which move across the area. Details of the structure and other characteristics of these easterly wave troughs are given. A study of the occurrence of fast winds and their relationship to the rainfall over Gangetic West Bengal is also included. *Subject Headings:* **1. Monsoon rainfall 2. Upper air flow patterns 3. West Bengal.**—*Author's abstract.*

12.3–402 **551.577.7:551.510.72**

Bleichrodt, J. F.; Blok, Joh.; Dekker, R. H., et al. (*all, Natl. Defence Res. Council T. N. O., Rijswijk, Netherlands*), **The dependence of artificial radioactivity in rain on rainfall rate.** *Tellus*, Stockholm, 11(4):404–407, Nov. **1959.** fig., 12 refs. **DLC**—The artificial radioactivity in rain was measured as a function of rainfall rate. As a rule an inverse relationship was found between the specific activity and the rate of rainfall. A tentative explanation is given. *Subject Headings:* **1. Radioactive rain 2. Rainfall rate. I. Lock, C. J. H.**—*Authors' abstract.*

12.3–403 **551.577.7:551.510.72**

*†Solodikhina, L. D., **Ob estestvennoĭ radioaktivnosti atmosfernykh osadkov.** [Natural radioactivity of atmospheric precipitation.] *Akademiia Nauk SSR, Izvestiia, Ser. Geofiz.*, No. 2:276–283, Feb. **1959.** 4 figs., 6 tables, 21 refs. **DLC.** Transl. into English in the corresponding number of the *Akademiia Nauk SSSR, Bulletin of the Academy of Sciences*, USSR, *Geophysics Series.* **DLC**—An attempt is made to find a relationship between the magnitude of radioactivity of precipitation and its intensity, aggregate condition and type, that is shower and drizzle, snow grains and snow flakes and to explain whether radioactivity is acquired by the drops during their fall from the clouds to the earth. The work was carried out during the Elbrus Expedition and in the Terskol Observatory (northern Caucasus). All precipitation investigated was associated with the passage of fronts. In all cases the height of the cloud system from which the precipation fell was 1300–1500 meters above the Terskol Valley. The collection of precipitation samples and the measurement of radioactivity with MST-17 counter are described. Calibration curves, curves of disintegration of radioactivity in precipitation samples and curves of the amount of specific activity of different types of precipitation as a function of intensity and numerical data on the activity of precipitation of samples collected are presented. The amount of specific activity of atmospheric precipitation is associated with their intensity: the specific activity decreases as the intensity of precipitation increases. The

amount of specific activity differs for different types of precipitation. According to decrease in specific activity they can be arranged as follows: granular snow, shower, snow flakes and drizzle. The activity of snow flakes and drizzle is similar. In solid precipitation (snow) RaC prevails, in fluid precipitation (thunderstorm and drizzle rain) RaB prevails. Rain drops wash away part of the radioactive substance from the atmosphere during their fall. The amount of radioactive substances washed away by rain drops depends upon the intensity of the rain. The maximum amount of radioactive substance is washed away by rain of slow intensity. *Subject Headings:* **1. Radioactive rain 2. Natural radioactivity of precipitation.**—*I.L.D.*

## RAIN, SNOW AND HAIL (551.578)

*See also:* **Hail damaging occurrence at high altitudes** (Appleman, Lehr), 12.3–49; **Forest influences on snow accumulation** (Bogdanova), 12.3–83; **Snow properties** (Anderson), 12.3–203; **Snow viscosity** (Nakaya), 12.3–213; **Forecasting snowstorm of Nov. 6–7, 1953** (Fulks), 12.3–254; **Radiation measurement on snowfields** (Hanson), 12.3–301; **Back-scattering from ice spheres** (Herman, Battan), 12.3–307; **Viscole data, Romania** (Bălescu, Beşleagă), 12.3–351.

12.3–404 551.578.1:551.578.7:629.13

Jones, R. F., **The occurrence of raindrops and hail of diameter 2 mm or greater in the atmosphere.** *Great Britain. Aeronautical Research Council,* [*Pub.*] *ARC* 20,765, Feb. 11, **1959.** 9 p. tables. Cataloged from *NASA Tech. Pubs. Announcements,* No. 9:12, Sept. 29, **1959.**—This is a preliminary assessment of the frequency with which the meteorological conditions will be encountered which will lead to greater damage of the forward-facing parts of aircraft due to impact of raindrops and hail. It is an amplification of a paper presented to a symposium on rain-erosion problems. *Subject Headings:* **1. Aircraft damage by raindrops and hail 2. Raindrop sizes 3. Hailstone size.**—*NASA abstract CN-73878.*

12.3–405 551.322:551.578.46(988)

*Butkovich, Theodore R., **Some physical properties of ice from the Tuto tunnel and ramp, Thule, Greenland.** *U. S. Snow Ice and Permafrost Research Establishment, Research Report 47,* May **1959.** 17 p. 7 figs., 11 tables, 7 refs., 4 eqs. **DWB, DLC**—Strength, density, elasticity, crystal size, bubble size, and fabric of the ramp ice and 5 types of tunnel ice were studied, and ice temperatures and ceiling deformation in the tunnel were measured. Crushing and ring tensile strength tests were made in a tunnel room at −5°C on cylindrical cores (3 in. diam and 9 in. long) taken horizontally and vertically in the tunnel and vertically in the ramp, and flexural strength was measured on horizontal and vertical beams from both the tunnel and the ramp. The crushing strength of tunnel ice showed slight differences among ice types, but not between horizontal and vertical samples, and fitted the empirical equation relating crushing strength to density. The equation did not hold for ramp ice of average density, probably because of layering. The results of ring tensile tests were similar to those of crushing tests, except that the equation relating ring tensile strength to the density of high-density snow gave values about 20% higher than for tunnel ice. The flexural strength of ramp ice was about half that for tunnel ice and comparable to, but consistently lower than, ring tensile values. The static modulus of elasticity was about 1/5 the average dynamic modulus, and increased with increasing rate of load application, approaching the value of the dynamic modulus as a limit. Lower values of the static modulus were observed for ramp ice. Deformation studies in a tunnel room (100×30 ft) indicated that the room is closing primarily by a block action. *Subject Headings:* **1. Ice tunnel 2. Tunnel ice properties 3. Ramp ice properties 3. Tuto Tunnel, Thule, Greenland.**—*Author's abstract.*

12.3–406 551.578.46:311.214(71)

Jackson, C. I. (*London School of Economics and Political Science*), **Snowfall measurements in northern Canada.** *Royal Meteorological Society, Quarterly Journal,* 86(368):273–275, April **1960.** Table, 6 refs. [**Comment by**] Richard W. Longley and [**Reply by**] Jackson, *Ibid.,* 86(370):556–567, Oct. **1960.** **DWB, DLC**—Sources of error in Canadian snowfall records are discussed, with particular reference to the six-hour interval between measurements. Very slow rates of fall are usual at high latitudes and these cause "traces" of snow to be recorded frequently which are not included in precipitation totals. Experience on Ellesmere Island suggests that the contribution from these traces may form a high proportion of total winter snowfall and a longer interval between measurements seems desirable. *Subject Headings:* **1. Snowfall measurements 2. Ellesmere Island, Canada 3. Canada.**—*Author's summary.*

### HYDROMETEOROLOGY (551.579)

*See:* **Hydrologic engineering** (Biggs et al.), 12.3-1; **Hydrogeology** (Ovchinnikov), 12.3-4; **Moisture zones in soil** (Béranger), 12.3-167; **Monsoon effects on floods** (Naqvi), 12.3-346.

## CLIMATOLOGY AND BIOCLIMATOLOGY

### CLIMATOLOGY (551.58)

*See also:* **Statistical methods in climat.** (Sneyers), 12.3-219; **Cartographic techniques in climat.** (Robinson, Bryson), 12.3-220; **Graphical methods in climat.** (Untersteiner), 12.3-221.

12.3-407 551.58(47)

Khromov, S. P., **Über den gegenwärtigen Stand der sowjetischen Klimatologie.** [The present status of Soviet climatology.] *Zeitschrift für Meteorologie,* Berlin, 12(1/2):2-5, Jan./Feb. **1958. DWB, DLC**—The principal tasks of Soviet climatology during the past 40 years involved a comprehensive climatic description of the country and establishing a theoretical basis for climatology. New monographs on air temperature, pressure, wind and precipitation are being prepared by Rubinshteĭn, Kaminskiĭ and Drozdov, and also a climatic atlas of the U.S.S.R. is in progress. Climatic descriptions on the basis of weather types (FEDOROV and BARANOV), application of statistical methods to climatology, such as series reduction, interpolation, etc., and climatic classifications (VOZNESENSKIĬ, BERG, ALISOV) have been developed. Studies on continentality, air mass climatology or dynamic climatology, circulation types, radiation and moisture balance, the hydrological cycle, evaporation, microclimatic and paleoclimatic studies are mentioned. *Subject Headings:* **1. Soviet climatology 2. U.S.S.R.**—*I.L.D.*

### CLIMATIC ZONES (551.581)

*See:* **Radiation climat., Europe** (Black), 12.3-297; **Latitude influence on climate** (Emsalem), 12.3-444.

### CLIMATE OF PARTICULAR PLACES (551.582)

*See also:* **Climate, U. S.** (Buzovkin), 12.3-7; **Climate, Sikhote Alin** (Arkhangel'skiĭ), 12.3-8; **Climate, Ukraine** (Buchinskiĭ), 12.3-9; **Climate, Macao** (Ferreira), 12.3-15; **Marine climate, S. Pacific,** 12.3-16; **Climat. data, Bombay,** 12.3-229; **Climate of Cairo desert** (Kassas, Imam), 12.3-436; **Climate, Morocco** (Joly), 12.3-437; **Climate, Canary Is.** (Font), 12.3-445.

12.3-408 551.582.2(438) 550.3:551.501.9(438)

*Polonska, Maria, **Klimat Raciborza.** [The climate of Ratibor.] *Przeglad Meteorologiczny i Hydrologiczny,* Warsaw, 6(1/2):47-60, 1953. 9 tables, 11 refs., 2 eqs. Germany summary p. 60. **DWB**—This is a digest of an extensive study of geophysical and meteorological conditions prevailing in the region of Ratibor undertaken by the author in view of the opening there of the Silesian Geophysical station of the Polish Academy of Science. It is based on scattered meteorological material from German and Polish sources, which has been systematized and classified for the periods 1881-1930, 1931-1936 and 1938. The missing data on wind speed have been replaced by anemograph recordings for the years 1949-1950. All the processed material is presented in a series of tables showing the yearly and monthly variation of mean and extreme temperature, air pressure, air humidity, mean cloudiness, number of clear and cloudy days, amount of precipitation, wind speed and directions. *Subject Headings:* **1. Geophysical observatory sites 2. Climate of Ratibor, Poland 3. Climatic data 4. Ratibor, Poland.**—*A.M.P.*

12.3–409 551.582.1(47)

Mikhaĭlov, N., **Zima i leto.** [Winter and summer.] *Vokrug Sveta,* Moscow, No. 1:18–25, Jan. **1954.** illus. (incl. photos.) **DLC**—After citing examples of the extremes of the climate of Russia and pointing out that if there were no ocean the climate would not have been so varied and would be determined permanently by the seasonal solar regime, the author explains and illustrates the mechanism of the annual heat transport from tropics to poles and the varying transfer from ocean to continent and vice versa, the effect of air currents transporting heat and moisture, the influence of cyclones and anticyclones, and the flow of WE and EW winds over mountain barriers, etc. in summer and winter respectively; and gives a sketch of the climate in different sectors of U.S.S.R. Finally he discusses the climate of U.S.S.R. and concludes that with the exception of a small portion of the territory with a polar climate, and a still smaller portion with subtropical climate, the rest of the country has a moderate continental climate with all of its advantages and disadvantages. *Subject Headings:* **1. Climate of U.S.S.R. 2. Climatological sketches 3. Heat transport 4. Oceanic influences 5. U.S.S.R.**—*A.M.P.*

12.3–410 551.582.1(528)

Ishigaki-Jima (Ryukyu Islands). Observatory, **The climate of the Yaeyama group, Ryukyu,** Feb. **1953.** Transl. prepared by Engineer Intelligence Div., Office of the Engineer, Headquarters, U. S. Army Forces, Far East, Tokyo, July **1956.** 32 p. carbon of typescript. chart, tables (some fold.) "Unedited." **DWB** (M82.1/528 179c)—The basic meteorological or climatic elements (1897–1950) and the typhoons which have affected this southern group of the Ryukyus are described and tabulated with charts and graphs. Ocean currents and earthquakes are also treated graphically and in text. *Subject Headings:* **1. Climate of Yaeyama group, Ryukyu Islands 2. Ryukyu Islands, Western Pacific**—*M.R.*

12.3–411 551.582.2:551.524.2/3(64)

Debrach, J.; Ousset, J. and Michel, M., **Données nouvelles sur la température de l'air au Maroc. Première partie.** [New data about temperature of air in Morocco, Pt. 1.] *Rabat, Morocco. Institut Scientifique Chérifien, Service de Physique du Globe et de Météorologie, Annales,* 18:67–115, **1958.** fig., 3 tables, 9 charts, 10 refs. **DLC.**—A statement of new statistics relating to temperatures in Morocco. Study of temperatures distribution is based on 74 stations, of which 38 are situated between 0 and 500 meters above sea level, 18 between 500 and 1000 meters, 11 between 1000 and 1500 meters and 7 are situated at an altitude superior to 1500 meters. Survey of the observation method, description of the thermometers and screens used. Table VII gives, in alphabetical order, a list of the meteorological stations (co-ordinates, duration of observations, etc.). Tables II and III indicate the mean, extreme and absolute extreme temperatures. Charts give the distribution of minimum and maximum temperatures for the months of Jan., April, July and Oct. They record the influences of sea nearness, altitude and latitude. *Subject Headings:* **1. Climatology of Morocco 2. Temperature 3. Morocco.**—*A.V.*

12.3–412 551.582.2(673)

*Denis, Jacques, **Une colonie agricole européenne en Afrique Tropicale: Cela, Angola Portugais.** [A European agricultural colony in tropical Africa: Cela, Portuguese Angola.] *Belgium. Direction Générale de l'Agriculture, Bulletin Agricole du Congo Belge,* 27(2):387–424, April **1956.** p. 390–393, Climatological data. **DWB**—This article on the physical and economic geography of the Cela region (a plateau in Central Angola), contains a chapter (p. 390–393) with 2 graphs and 2 tables, giving a summary of climatic conditions in this area (12°S, 13°E) based on data for one station, Cela, for 1951–1955. There is a marked double maximum of precipitation (March-April, and Oct.–Nov.), and a complete lack of precipitation in June and July (sometimes May–Aug.). Temperature ranges from 10° to 20°C or more between day and night, days are uniformly warm, nights often quite cool. Fog fills the valleys almost every night in July Sept. *Subject Headings:* **1. Climate of Central Angola 2. Cela, Angola.**—*M.R.*

12.3–413 551.582.2(675)

†*Noirfalise, Albert, **Le milieu climatique.** [The climatic environment.] *Institut des Parcs Nationaux du Congo Belge, Exploration du Parc National de la Garamba, Mission H. De Saeger,* [*Pub.*] No. 6, **1956.** 75 p. 15 figs., 21 tables, 27 refs. **DWB** (M82.1/675 159ex)—A monograph giving a complete analysis of the climatic data available for the Garamba National Park located in the Haut-Uele section of the Belgian Congo (40°N, 29–30°E) on the border of the Sudan. The data for Faradje and Gangala-na-Bodio are mainly standard precipitation and temperature data. A special station was installed from Dec. 1949–Sept. 1952 at Camp de Bagbele and Camp de la Garamba in the immediate park area. Psychrometric, wind and evaporation data were obtained at 08, 12 and 18 h local time. Satellite stations were operated temporarily. Wind, precipitation, temperature, humidity, evaporation, etc. are analyzed in great detail in Pt. 1. Pt. II discusses the local and micro-climates in the savannah. Soil temperature and moisture, thermal gradients and effects of vegetation are considered. *Subject Headings:* **1. Climatology of Garamba Park, Belgian Congo 2. Ecoclimatology 3. Garamba Park, Belgian Congo.**—*M.R.*

12.3–414 551.582.1(749)

*Biel, Erwin R. (*College of Agric., Rutgers Univ.*). **The climate of New Jersey.** Reprinted from **The Economy of New Jersey,** a report prepared for the Dept. of Conservation and Economic Development of the State of New Jersey [by] Rutgers Univ. (p. 53–98). Reprint issued New Brunswick, N. J., Agricultural Experiment Station, **1958.** 9 figs., 10 tables. **DWB** (M82.1/749 B587cL)—Climatic factors that control the weather of New Jersey are discussed. The author gives data and charts as well as state maps on the dynamic climatology, the climatic elements, and climatic applications to agriculture, city climate, subdividing each of these phases into several discussive units. Among these units are climatic controls, pressure and wind patterns, air masses, temperature, precipitation, cloudiness, thunderstorms, growing season, frosts (types and protection), fogs, pollution, soil moisture, microclimate, and others. Various related problems are discussed. *Subject Headings:* **1. Climatic data 2. Climate control 3. Climate of New Jersey 4. New Jersey.**—*N.N.*

12.3–415 551.582(757)

Kronberg, Nathan; Purvis, John C. and Collings, Gilbeart H., **The climate of South Carolina.** *South Carolina. Agricultural Experiment Station, Clemson, Climatic Series,* No. 1, July 1958. 20 p. 2 charts, tables, 10 refs. **DWB** (M(051) S726cL)—The pamphlet contains a brief analysis of the climatic factors that have made South Carolina what it is climatically—with fairly even precipitation and a relatively mild climate. The climate of the state is general, temperature, growing season, chilling hours, heating degree days, air-conditioning, precipitation, sunshine, relative humidity, droughts, thunderstorms and hail, tornadoes, hurricanes, floods, cloudiness, wind, as well as growth and development of the state are described. Many descriptions of local weather summaries and maps are included. *Subject Headings:* **1. Climate of South Carolina 2. South Carolina.**—*N.N.*

12.3–416 551.582.1(789)

Anchorage, Alaska. Chamber of Commerce, **The Anchorage climatic picture.** March, **1958.** (2) p. 2 tables. Reproduced from typescript. **DWB** (M82.1/798 A539an)—Salient features of the climate of Anchorage are described showing it to be much less severe than generally believed. Effects of the climate on patterns of living are pointed out. A table comparing average monthly temperatures at Anchorage, Fairbanks, Bismark, Helsinki and Yakutsk, and one containing monthly values of precipitation and sunshine, are presented. Climatic records for the Anchorage area cover the last 34 years. *Subject Headings:* **1. Climate of Anchorage, Alaska 2. Climate records 3. Anchorage, Alaska.**—*G.T.*

12.3–417 **551.582.2:551.584.2**(83)

Kunkel, Günther, **Beobachtungen über Klima und Vegetation in Südchile.** [Observations on climate and vegetation in South Chile.] *Akademie der Wissenschaften, Berlin. Klasse fur Chemie, Geologie und Biologie, Abhandlungen,* No. 9, **1955.** 50 p. 29 figs., 19 tables. **DLC** (QK950.C4K8). Review by M. Keri in *Idöjárás,* Budapest, 61(2):163, March/April **1957.** Review by F. Seyfert in *Angewandte Meteorologie,* Berlin, 3(2):62–63, **1957.** Review by F. Steinhauser in *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B,* 8(3/4):451, **1958.** Review by F. Sauberer in *Wetter und Leben,* Vienna, 9(3/5):83, Jan. 9, **1957.** Review by W. Boer in *Zeitschrift für Meteorologie,* 11(8):251, Aug. **1957.**—This is a study which includes detailed (micro) meteorological data for 1953–54 recorded by the author while acting as technical assistant at the ecological experiment station of the University of Concepcion, at Fundo Mininco/Malleco (150 m.a.s.) Chile. It also gives an ecological view *in situ.* Author aims to show here that the soil erosion, although climatic conditioned, would have been that severe had it not been for man, an idea summed up in the last sentence of the paper **The outlook of the soil reveals the character of the owner.** The tables include temperatures (air, soil, water), precipitation, cloudiness, sunshine and humidity in mean values as well as for specific experiments conducted. Extreme soil temperature was 57.6°C when the air temperature was 21.5°C. *Subject Headings:* **1. Climate of Chile 2. Micrometeorological data 3. Soil erosion 4. Chile.**—*W.N.*

12.3–418 **551.582.1**(87)

Sifontes, Ernesto (*Guayana, Venezuela*), **Del Orinoco al Avila.** [From the Orinoco to El Avila.] Barcelona, Spain, Sociedad Alianza de Artes Gráficas, **1958.** 26 p. photos. At head of cover-page: Meteorología tropical. **DWB** (M82.1/87 S573or)—Brief notes on microclimate of Caracas May 21–June 1, 1957. Readings of temp., relative humidity, pressure, wind and sky made hourly or less often on auto trips are tabulated and summarized in an illustrated pamphlet showing the city, buildings and sites of interest in and around Caracas. *Subject Headings:* **1. Climate of Caracas 2. Caracas, Venezuela.**—*M.R.*

12.3–419 **551.582.1**(94)

*Australia. Commonwealth Bureau of Census and Statistics, **Yearbook of the Commonwealth of Australia,** No. 44, **1958.** p. 29–60, **Climate and Meteorology of Australia.** 6 charts (fold.), tables, **DWB** (M82.1/94 A938o)—A section of this yearbook contains an extensive discussion of temp., comfort zones, frosts, high temps., humidity, evaporation, rainfall, heavy rains, snow, hail, pressure, wind, monsoons, storms, influence of forests on climate and rainfall and standard climatic tables for 8 major cities in Australia based on 30 yrs of record. Folded charts of Australia show distribution of normal daily maximum and minimum temp. in Jan. and July, number of consecutive days with temp. ≥100°F, average frost-free period, average annual evaporation, and average annual rainfall, seasonal variations in rainfall (histograms), wind roses (9 a.m. and 3 p.m. by months). Extreme values have been taken from longest period of record: Perth 60 yrs, Darwin 88 yrs, Adelaide 18 yrs, Brisbane 105 yrs, Sydney 98 yrs, Canberra 29 yrs, Melbourne 101 yrs, and Hobart 87 yrs. *Subject Headings:* **1. Climate of Australia 2. Climatic data for Australia 3. Australia.**—*M.R.*

12.3–420 **551.582.2**(752) **551.588.7**

*U. S. Weather Bureau, **Climatic guide for Baltimore, Maryland.** Its *Climatography of the United States,* No. 40–18, 1956. 37 p. mostly tables. **DWB**—This guide book gives a summary of the climatic factors, viz.: temperature, precipitation, wind, air moisture content, pressure, time of sunrise and sunset, the percentage frequency of selected ceiling heights and other detailed climatic data for 1817–1954 for the Baltimore area (compiled during 1955). There is appreciable difference between temperatures experienced in the city of Baltimore and the suburban areas and nearby towns. Rainfall distribution is rather uniform. Most rainfall during the summer occurs in connection with thunderstorms. The history of weather records in the area since 1606 is given. About 40 tables and a number of charts are included. Normals for each element, frequencies, of consecutive days with precipitation of various amounts, rainfall intensity, duration frequency curves, degree-days, and a comparison with other cities in the

U. S., are included. *Subject Headings:* **1. Climate of Baltimore 2. Urban climates 3. Baltimore, Md.**—*N.N. & M.R.*

## CLIMATIC CHANGES (551.583)

*See also:* **Solar effects on climatic change** (Link), 12.3–108; **Atmos. circulation trends** (Girs), 12.3–113; **Climat. change and continental drift** (Ma), 12.2–190; **Rhythm of severe winters** (Knoch), 12.3–319.

12.3–421 **551.583**

†MacGinitie, H. D. (*Humboldt State College, Arcata, Calif.*), **Climate since the late Cretaceous.** *American Association for the Advancement of Science, Publication,* No. 51:61–79, **1958.** 49 refs. **DLC, DWB** (591.97 Z87zo)—The word "climate" of the late Cretaceous and early Tertiary was vastly different from today. The physical features, temperature and flora and fauna offer a striking contrast to the present. The seas were much warmer than at present; as a result polar climates did not exhibit "extended and bitter arctic cold." Tropical, warm-temperate, or even cool-temperate forest flora could possibly live and develop in high arctic altitudes. Later, there was an irregular but, in the long run, a continuous change over the whole world toward cooler and also in general drier climates. This affected profoundly the evolution and distribution of living plants and animals. Presently there is again in evidence a warming up of world climate. As to the causes of world climatic changes, consideration of two fundamental controls: 1) composition of the atmosphere and 2) amount and kind of solar radiation, is important. The theories of wandering poles and drifting continents contradict the known facts concerning the distribution of fossil floras. The fundamental cause of world climatic changes has its origin in small fluctuations in the amount and kind of solar radiation, although these solar changes are considerably modified by the resulting changes in ocean temperatures. Concentration of $H_2O$ and $CO_2$, on a more local scale, by topographic changes. *Subject Heading:* **1. Climatic changes.**—*I.S.*

12.3–422 551.**583.1**:551.324.431(234.3)

Tollner, Hanns, **Eine bemerkenswerte Änderung des Sommerklimas in der ostalpinen Höchgebirgsregion.** [A remarkable change in the summer climate of the East Alpine mountain region.] *Zeitschrift für Meteorologie,* Berlin, 11(12):376–377, Dec. **1957.** fig. **DWB, DLC** – Since 1951 the climate of the East Alpine region has altered so as to favor the growth of glaciers. The number of days with solid precipitation on the Rauris Sonnblick, at 3100 m, during June, July and August has risen to 52 as compared with 28 in 1947. Sunshine duration in these months has dropped from 600 hours in 1951 to 400 hours; this was accompanied by a drop in mean summer temperature from 1.8°C to 0.0°C. The smaller glaciers have been protected in recent years by a residual firm cover and they show some advances. The significance of this to the hydroelectric work is discussed. *Subject Headings:* **1. Climatic variations 2. Summer climate 3. Glacial accretion 4. Eastern Alps.**—*I.L.D.*

12.3–423 551.**583.14**:551.**577.32**(728.4)

Portig, Wilfried (*San Salvador, C. A.*), **Klimapendelungen in San Salvador, Mittelamerika.** [Climatic oscillations in San Salvador, C. A.] *Annalen der Meteorologie,* Hamburg, 8(5/6): 143–148, **1958.** 6 figs., tables, ref. **DWB, DLC**—The annual variation of rainfall in San Salvador, based upon a 39 year period, shows maximum amounts during the "months" June 3–July 2, and Sept, 5–Oct. 4, of 30-day intervals rather than calendar months are used. An analysis of the annual and monthly rainfall of San Salvador by 11-year intervals showed that in 1930 the annual rainfall was 109% of the normal and in 1940's it was 90% of the normal, while Sept. and Aug. show no secular changes. June-Oct. and Feb. show very pronounced variation. The times of minima and maxima have changed their calendar positions. The minimum rainfall month has shifted from Jan. to March and to Feb.; the maximum rainfall from June to Sept. Also the position of the small intermediate minimum has shifted. The increase of precipitation from the driest to the wettest month manifests considerable variation; in 1930 the rise from March to June was 3 months; in 1940 the rise from Feb. to Sept. was 7 months. The decline to the dry period shows "secular" oscillations which are slighter when the period of the second maximum is the beginning. The displacements of rain extremes are such that the seasons either approach or recede from one another so that the minima almost always move toward the principal maximum. Finally, the 30-year normals vary depending upon the 30-year period used. The total variation can be considered as a variation of the Bruckner period of 35 years, for calculation purposes 36 instead of 35 years are assumed. A harmonic analysis of the original rainfall totals indicates that the phase angles of the Bruckner period manifests a complex annual variation. The rainfall of San Salvador does not show random variations around a fixed normal but instead manifest climatic oscillations of rhythmical structural seasonal changes. It seems that the maximum of annual rainfall totals coincides with the strongest warming of the polar region. *Subject Headings:* **1. Climatic oscillations 2. Annual rainfall variations 3. San Salvador, El Salvador.**—*I.L.D.*

12.3–424 551.577.33:551.583:14/15(09)(443.6)

Sanson, J., **Des observations météorologiques scientifiques ont succédé depuis plus de 80 ans dans la région parisienne aux chroniques sur le temps des siècles passés.** [Scientific meteorological observations have been made for more than 80 years in the Paris region: chronicles concerning the weather during the past centuries.] *Bulletin des Engrais*, Paris N⁰. 403:8–9, Jan. **1958.** 2 tables, and id. No. 404:36–38, Feb. **1958.**—Commentaries on the evolution of the means of temperature, sunshine and precipitation for the decenniums from 1876 to 1955. No periodical variation has appeared in the evolution of temperature and sunshine, but the depths of rainfall seem to have risen in successive groups with a duration of about 40 to 45 years each. They are being characterized through gradual exhaustion and the following increase of precipitation. While examining the chronicles of weather since the 15th century the author discovered this periodicity regarding precipitation. *Subject Headings:* **1. Long period climatic fluctuations 2. Precipitation periodicities 3. Paris, France.**—*A.V.*

12.3–425 551.583.3:581.33:551.585

Beenhouwer, Owen (*Conservation Program, Yale Univ., New Haven*), **Palynology and the Thornthwaite climatic classification.** *Ecology*, 34(4):803–804, Oct. **1953.** 3 refs. **DLC**—It has been suggested (by PAUL SEARS) that the ranges of trees whose pollen is important in North American pollen analysis (profiles to determine changes of climate) be charted according to Thornthwaite's (1948) system of climatic classification. It was found that nothing could be learned about the actual climate or changes in climate by this method, but only about the extremes under which the species or genera grew and these are too broad to allow accurate interpretation. It is suggested that broad terms such as cold-wet or warm-dry would be as useful in such studies as would the more detailed Thornthwaite system, at least until more is known of climatic relations and the present species' habits. *Subject Headings:* **1. Pollen analysis 2. Thornthwaite's classification.**—*M.R.*

12.3–426 551.583.3:581.16

Durno, S. E., **Pollen analysis of peat deposits in eastern Sutherland and Caithness.** *Scottish Geographical Magazine*, Edinburgh, 74(2):127–135, Sept. **1958.** 6 figs., 9 refs. **DLC**—Part of a long-term project to study the vegetational history of Scotland by pollen analysis. Five cross-sections from peat deposits in Sutherland and in Caithness (northern edge of the Highlands) are presented and analyzed. Two of the sites were in the Highlands and two in the Caithness Plain. The two plains sites do not show the Pine maximum which shows up in the Highland sites during the late Boreal and Atlantic. The Boreal/Atlantic transition marked a change from cold winters and warm dry summers to increased precipitation and more uniform temperature of the Atlantic, yet no great change in pine pollen frequency was noted after the transition at the Highland stations. *Subject Headings:* **1. Pollen analysis 2. Boreal/Atlantic climates 3. Caithness, Scotland.**—*M.R.*

12.3–427 551.583.7

*†Butzer, K. W., **Quaternary stratigraphy and climate in the Near East.** *Bonner Geographische Abhandlungen*, Bonn, No. 24, **1958.** 157p. 16 figs., 4 maps, 2 diagrs., 14 tables, bibliog. p. 147–157. German summary for each chapter p. 143–146. **DWB** (M(055)B716)—

This investigation on Pleistocene and Holocene climatic variation in the Near East, originally presented to the Math-Naturwissenschaftliche Fakultät of the Rheinische Friedrich-Wilhelms-Universität, Bonn, as a doctoral thesis consists of the following chapters: I. Introduction and retrospect of the European chronology; II. General atmospheric circulation of the Near East (the westerly circulation during the transitional and winter seasons, the summer circulation); III Glacio-Eustatism and the marine Quaternary of the Near East; IV. Pleistocene glaciation and periglacial activity in the Near East; V. Middle and upper Pleistocene pluvial chronology; VI. Postpluvial variations of climates; VII. Atmospheric circulation of the Near East during the upper Pleistocene and Holocene (general atmospheric circulation patterns, the meteorological aspects of the Near Eastern climatic succession, some qualitative contributions to the amplitude of climatic variations). Although the study is primarily paleoclimatological in scope, it was possible to obtain an invaluable insight into the Quaternary morphology of the Near East during a private field-trip to Egypt and Jordan in the winter of 1956. It was not intended to perform any specialized field investigations during this time. Rather it was attempted to obtain a good perspective of the associated morphological problems and to reexamine the sites and field-results of previous researchers. *Subject Headings:* **1. Paleoclimatology 2. Quaternary stratigraphy 3. Climatic variations 4. General atmospheric circulation 5. Glaciation 6. Near East.**—*A.V.*

## MICROCLIMATOLOGY (551.584)

*See also:* **Microclimate of runways** (Glaser), 12.3–52; **$CO_2$ flux over sugar beet field** (Monteith, Szeica), 12.3–260; **Micromet. data, Chile** (Kunkel), 12.3–417.

12.3–428 551.584:551.501.45.

Rauner, Iu. L., **Klimatologicheskaia obrabotka rezul'tatov mikroklimaticheskikh nabliudeniĭ** [Climatological analysis of results of microclimatic observations.] *Akademiia Nauk SSSR, Izvestiia Ser. Geofiz.*, No. 2:258–264, **1957.** 9 figs., table, 7 refs. **DLC.** Transl. into English in the corresponding number of the *Akademia Nauk SSSR, Bulletin of the Academy of Sciences, USSR, Geophysics Series.* **DLC**—A more generalized utilization of short term microclimatic data for practical purposes is illustrated by the application of linear correlation to microclimatic data. It is shown that a very close statistical dependence exists between the air temperature over an unirrigated part of a field and the microclimatic differences between the dry and irrigated portion. Such relationships are linear over the entire range of the mean daily temperature of the growing season. The air temperature (in climatological intervals and mean daily temperature) can be used as a meteorological element for adducing microclimatic series for mean secular conditions. The possibility of relating microclimatic data to circulation conditions is indicated. *Subject Heading:* **1. Microclimatic data analysis.**—*I.L.D. and author's conclusion.*

12.3–429 551.584.1

Kaiser, H., **Uber den "Strahlungstyp" und den "Windtyp" des Mikroklimas.** [Radiation type and wind type of the microclimate.] *Meteorologische Rundschau*, Berlin, 11(5):162–162, Sept./Oct. **1958.** fig., 15 refs. **DWB, DLC**—The concepted analysis of the term microclimate which has the meaning of a "fair weather climate" and independent or autochthonous climate, which is characterized by periodic oscillations of the climatic elements, by local climatic difference depending upon topography and by local equalization currents with daily periodicity (mountain or valley winds, etc.). In the case of dependent or autochthonous climate foreign air masses of remote areas almost completely prevail over local characteristics. Independent microclimatics are associated with cyclonic weather. The concept of independent microclimate can be defined more precisely by considering the role of atmospheric radiation, which is its predominating cause. It may be classified as a radiation type climate. In the dependent climate radiation elements recede in importance and are replaced by the wind regime, so that the term "wind type climate" describes a dependent climate. These radiation and wind type climates correspond to "convection" and "advection weather." The fundamental differences between radiation and wind type climates are expressed in their respective heat balance. The former is characterized by "radiation evaporation" and the latter by "ventilation evaporation." A third type of microclimate is postulated; this is a type in which neither radiation or wind influence prevails. This is a neutral type in which all heat balance components tend towards zero. In this type of elements the atmosphere does not participate in any energy exchange with the ground that a certain correspondence develops between the microclimate on the one hand and the meso and macroclimate on the other hand; the microclimate actually disappears. *Subject Heading:* **1. Microclimate types.**—*I.L.D.*

12.3–430 551.**584.2**:551.**588.2**(431.8)

Schöne, V., **Geländeklimatische Untersuchungen im Forschungsraum Huy-Hakel der Deutschen Akademie der Landwirtschaftswissenschaften.** [Topoclimatic investigations in the Huy-Hakel research area by the German Academy of Agricultural Science.] *Angewandte Meteorologie*, Berlin, 3(5):129–135, Sept. **1958.** 5 figs., 12 refs. **DLC**—In the Huy-Hakel area a model landscape is being created to serve as a pattern for the reforestation of areas that had previously been forest or that are no longer suitable for agriculture and for the most suitable cultivation of the available usable land. This work of land reconstruction involved a detailed topoclimatic survey of the distribution of temperature and relative humidity and plotting the data on maps. The procedure in carrying out the climatic survey and its interpretation are outlined. Systematic measurements of atmospheric temperature and relative humidity were made with thermohygrographs at 50 cm above the ground, situated at 12 points and tied in to the climatic network by means of an instrument shelter situated at 2 m above the ground. Readings were made from July to Sept. 1953, and April–May and Aug.–Sept. 1954. Means showed no difference between points. A better differentiation among stations was obtained by grouping the hourly temperature values by 1°C intervals and expressing the total percent frequency in a probability diagram. By means of these groups the local climate of the Huy-Hakel area was described and mapped. Microclimatic maps of the area, a temperature profile through the area, etc., are presented. *Subject Headings:* **1. Topoclimatology 2. Local climatic studies 3. Climate of Saxony 4. Huy-Hakel region, Saxony, Germany.**—*I.L.D.*

12.3–431 551.**584.33**:551.**575.5**(57)(282.251)

Bashkirova, G. M. and Krasikov, P. N., **Nekotorye mikrofizicheskie kharakteristiki zimnikh Angarskikh tumanov v raĭone g. Irkutska.** [Some microphysical characteristics of winter fogs caused by the Angara River in the area of the city of Irkutsk.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 73, 37–49, **1958.** 9 figs., 2 tables, 15 refs. **DWB**—The results of a study of the microphysics of evaporation fogs during negative temperatures carried out in the vicinity of Irkutsk on the Angara River are presented and analyzed. The aqueous content of fogs was determined by the use of the Zaitsev apparatus, which involves the precipitation of droplets and crystals from fog current upon colored filter paper. Measurements of the water content of fogs had values of 0.03 to 0.37 g/m$^3$. With a drop in air temperature flowing over the water surface, the water content of fog increased. Qualitative observation on phase condition of clouds showed that at an air temperature of −15°C the fog contained only liquid droplets, at −11°C a mixture of liquid drops and ice particles; but in the case of further drops of temperature in mixed fogs the ice phase increased and often pure ice fogs, containing crystals and frozen droplets were observed. In contrast to the Angara River fogs liquid drops exclusively were observed in Kola evaporation fogs at −17° and −18°C, at lower temperatures there was a mixture of fluid drops and ice crystals. The character of the change of the size spectrum of disperse fogs with variation of air temperature and density of Angara and Kola evaporation fogs is essentially similar: at mutually close air temperatures the prevailing dimensions of particles and their range increase with increasing density of the fog; with decreased air temperature for fogs of similar density, the size spectrum of the particles usually became compressed and shifted in the direction of smaller values. The relative shapes of ice crystals of fogs was observed up to −20°C platelike crystals predominate and below −20°C columnar shapes. Data on distribution of crystal sizes, on density of fogs, intensity of evaporation fogs, etc., are presented in tables. *Subject Headings:* **1. Winter fog 2. River micrometeorology 3. Fog structure 4. Irkutsk, Siberia.**—*I.L.D.*

12.3–432 551.584.5(437.11)

*Gregor, Alois, **Charakteristika počasí v Praze za 25 let podle bodovacích výsledku.** [Characteristics of weather at Prague during 25 years according to an evaluation by a point system.] *Meteorologické Zprávy*, Prague, 11(6):130–134, **1958.** 7 tables, 6 refs. German and Russian summaries p. 130. **DWB, DLC**—For the last 25 years the author has been rating the weather of Prague by assigning grades from 0–5 to such elements as sunshine, precipitation, visibility, temperature sensation, state of the soil and general weather. By adding up the partial scores, total index values from 0 to 30 are obtained. Index numbers are tabulated for Prague for 1932–1957 and details of the rating criteria are discussed. The method was originally devised for comparison of weather conditions in the city with those at resorts, but it can be used for evaluating weather at a single location from the point of view of various human activities. The method could be made completely objective if the necessary special instruments were available. *Subject Headings:* **1. Weather type classification 2. Climate of Prague 3. Prague, Czechoslovakia.**—*G.T.*

12.3–433 551.584.65:591.9

Derouet, Louise and Dresco, Edouard, **Recherches souterraines dans les Monts Cantabriques (Espagne, 1954). Notes de chasse. -Comte-rendu des températures relevées.** [Subterranean research in the Cantabrian Mountains( Spain, 1954). Field notes—record of temperature observations.] *Speleon*, Oviedo, Spain 6(3):159–176, Sept. 1, **1955.** 4 figs., **DWB**—Data on cave temperatures and fauna obtained during exploration of 28 caves in the Cantabrian Mts. of Spain in Aug. 1954. Conclusion is that temperature is not a dominant factor in survival of cave fauna, that dry dusty caves are azoic, that in large caves fauna are often localized and hard to detect, and that small shallow caves have the best conditions for fauna. *Subject Headings:* **1. Cave temperatures 2. Cave fauna 3. Cantabrian Mts., Spain.** —*M.R.*

12.3–434 551.584.65:638.44:634.9

Jackson, William B. (*Dept. of Animal Behavior, Amer. Museum of Natl. History, N. Y. C.*), **Microclimatic patterns in the army ant bivouac.** *Ecology*, Durham, N. Carolina, 38(2): 276–285, April **1957.** 5 figs., 4 tables, 4 refs. **DWB**—Humidity and temperature (dry and wet bulb) readings were made (in 1952) several times a day in ant bivouacs and on the forest floor to show diurnal temperature patterns in 3 horizontal sections of a mid-nomadic and a late nomadic bivouac of the army ant (*Eciton hamatum Fabricus*) at Barro Colorado Island, Panama Canal Zone. Both the nomadic and statary bivouacs remained 1–2°C above the environmental temperature and had smaller fluctuations than ambient and had complicated diurnal cycles. *Subject Headings:* **1. Ant bivouac microclimates 2. Forest floor microclimates 3. Barro Colorado Island, Canal Zone.**—*M.R.*

12.3–435 551.584.9:628.4

Kozłowska-Szczęsna, Teresa, **Badania mikroklimatu hałd na terenie Górnośląskiego Okręgu Przmysłowego w 1955 r.** [Investigations on the microclimate of waste-dumps in the Upper Silesian industrial region, in 1955.] *Prezeglad Geograficzny*, Warsaw, 29(4):785–788, **1957.** tables. Russian and English summaries p. 788. **DWB**—The work sets forth preliminary results of investigations carried out on waste-dumps varying in shape and composition. The findings published relate primarily to thermal conditions in the ground, to a depth of 20 cm, on the surface of the dumps, on their overgrown sections and those deprived of vegetation, on variously exposed slopes, as well as in the immediate neighborhood of the dumps. These findings indicate that different kinds of waste-dumps and even separate sections thereof, call for particular plant cultures and particular methods of cultivation in view of microclimatic difference. *Subject Headings:* **1. Pit microclimatology 2. Thermal properties of soil 3. Refuse dumping 4. Upper Silesia.**—*Author's abstract.*

## CLIMATIC CLASSIFICATION (551.585)

*See also:* **Climat. classification, Ciechocinek** (Paszyński), 12.3–72; **Thornthwaite's classification** (Beenhouwer), 12.3–425.

12.3–436 551.582(62) **551.585.53**(62)

Kassas, M. and Imam, M., **Climate and microclimate in the Cairo desert.** *Société de Géographie d'Egypte, Bulletin,* 30:25–50, **1957.** 27 refs. (original unchecked). (Abstract from *Cairo. Scientific and Technical Documentation Centre, Bulletin,* Pt. 2, 4(9):117, Sept. **1958.**) – The application of several formulas and systems suggested for the classification of climate shows the intensive aridity of the climate of the Cairo desert. Studies on the microclimatic features show that adjacent points may differ in their temperature and moisture conditions in relation to relief. The south-facing slopes are consistently warmer than the north-facing slopes. The lower levels receive more water than the higher levels. Microclimatic differences correspond to microhabitat and vegetational differences. *Subject Headings:* **1. Climate of Cairo desert 2. Desert microclimatology 3. Arid zone climatology 4. Cairo, Egypt.**

12.3–437 **551.585.631.44/45**(64) **551.582.2**

*Joly, F. **Etude des indices de Thornthwaite pour quelques stations du Maroc.** [Study of Thornthwaite indexes for some stations in Morocco.] *Rabat, Morocco. Institut Scientifique Chérifien. Service de Physique du Globe et de Météorologie, Annales,* 18:119–128, **1958.** 2 charts, 5 tables, 6 refs. **DLC**—Examination of the boundaries of the semi-arid and arid zones in Morocco, through determining the various Thornthwaite indexes for 46 Moroccan climatological stations. Tables give for 4 stations selected in 4 different types of climates (humid, subhumid, semi-arid and arid) the monthly and annual values of temperature, rainfall, evapotranspiration, deficit and excess resulting from the hydrological balance, indexes of aridity and humidity established according to Thornthwaite's method. The author establishes the climatological classification of all the stations through determining hydrometric types, thermal effectiveness, seasonal changes in humidity and summer concentration of thermal effectiveness. A chart shows the distribution of semi-arid, arid and hyper-arid zones. These 3 zones together cover more than 2/3 of the country, leaving beside only the mountainous ridge, the northern part of the Atlantic plains and some scarce small spots on the Central Plateau and in the North of Eastern Morocco. *Subject Headings:* **1. Climate of Morocco 2. Climatic classification 3. Arid and semi-arid zones 4. Thornthwaite indexes 5. Morocco.**—*A.V.*

## BIOCLIMATOLOGY (551.586)

*See:* **Weather effects on cotton fibre, Aden** (Lord), 12.3–62; **Weather effects on humus formation** (Kauffmann, Boquel), 12.3–63; **Darkness effects on flowering of plants** (Wellensiek), 12.3–64; **Weather effects on vineyard diseases** (Kundert), 12.3–65; **Weather sensitivity of rheumatism** (Whiten), 12.3–68; **Weather effects on body heat balance** (Goromosov), 12.3–69; **Biol. effects of long wave UV radiation** (Schulze), 12.3–70; **Climat. effects of sweating** (Heerd), 12.3–71; **Resort climatology, Ciechocinek** (Paszyński), 12.3–72; **Weather effects on rectal temp.** (Iampietro et al.), 12.3–73; **Climat. effects on tree growth** (Andersen), 12.3–81; **Climat. effects on tree growth** (Clark, Barter), 12.3–82.

## UPPER AIR CLIMATOLOGY (551.587)

12.3–439 551.587

Selezneva, E. S., **Raboty po aeroklimatologii, vypolnennye v GGO.** [Aeroclimatological work accomplished at the Main Geophysical Observatory.] *Tashkent. Geofizicheskaia Observatoriia, Trudy,* No. 11/12:5–9, **1956. DLC**—This report presented at the First All-Union Conference on Problems of Aeroclimatology at Tashkent on 25 Oct.–2 Nov. 1954 reviews the work carried out at the Main Geophysical Observatory during 1934–1954. The main fields of study were: description of wind distribution with height, characteristics of cloud boundaries, synoptic aerological studies, characteristics of clouds, airplane icing, the variability of meteorological elements in space, aeroclimatological investigations of droughts and dry winds, thunderstorms, breezes, mountain-valley winds, cold waves, etc. *Subject Headings:* **1. Upper air climatology 2. Main Geophysical Observatory, U.S.S.R.**—*A.M.P.*

## ENVIRONMENTAL INFLUENCES (551.588)

*See also:* **Forest influences on snow accumulation** (Bogdanova), 12.3–38; **Climate control** (Biel), 12.3–414; **Urban climate, Baltimore,** 12.3–420; **Topoclimat.** (Schöne), 12.3–430.

12.3–440 551.588

Wagner, Richárd (*Climatological Inst. Univ. of Szeged*), **A táj fogalma.** [The concept of regional environment.] *Földrajzi Közlemények*, Budapest, 80(4):335–354, **1956.** 4 figs. Russian and German versions p. 348–354. Also: [Discussion by several speakers and reply by R. Wagner.] *Ibid.*, 81(1):79–90. fig. Also German version, **Der Begriff der Landschaft,** in *Acta Geographica*, Szeged, Hungary, 2(1/4):3–20, **1956.** 4 figs. **DLC**—Regional environment is considered as being composed of ten geographic factors, namely, the earth, gravity, radiation, the earth's crust, the atmosphere, the hydrosphere, soil cover, flora, fauna and human population. Each of these factors and their interactions are discussed and illustrated by schematic diagrams. Research objectives provided by these elements of regional environment, and the role of the various branches of science in dealing with such objectives are determined. Some 20 participants contributed to the discussion; the problems most widely discussed were whether regional environment is a physical reality or just a working hypothesis (with almost universal agreement on the former), and how to rate human activity as an environmental factor. *Subject Headings:* **1. Environmental influences 2. Regional environment theories.**—*G.T.*

12.3–441 **551.588.4**:551.**521.1**:551.**513.1**(675)

*Schüepp, Walter (*Chef du Bureau de Rayonnement du Service Météorologique du Congo Belge*), **L'influence du fleuve au climat étudié à l'exemple du rayonnement a Lépoldville.** [Influence of a river on climate as shown by the example of radiation at Léopoldville.] (In: *Angola. Serviço Meteorológico, Miscelanea Geofisica*, Luanda, **1956.** p. 163–173. 3 figs., 4 tables, 2 refs. 4 photos. **DWB** (M(08) A592mi)—Radiation measurements at 3 stations less than 10 km from the base station (BINZA) near Léopoldville show considerable differences, reflecting a significant local circulation between river and forest. This type of circulation can be found in all equatorial regions; in humid climate it can be discerned by means of local cloud distribution. *Subject Headings:* **1. River influences on climate 2. Radiation measurements 3. Local atmospheric circulation 4. Léopoldville, Belgian Congo.** —*Transl. of author's abstract* (*G.T.*).

12.3–442 **551.588.6**:551.326.8(282:247.4)

Baĭdin, S. S., **O vliianii lesistosti basseĭnov na sroki vskrytiia malykh rek.** [Influence of the extent of forests in a basin on the breakup date of small rivers.] *Moscow. Tsentral'nyĭ Institut Prognozov, Trudy*, No. 48(75):104–110, **1956.** 3 figs., 4 tables, 10 refs. **DLC**—The retardation of snow melt and the break up of small rivers is, among other things, subject to the influence of the forest cover of a river basin. A comparison of the data of ice break up of adjacent rivers with basin of varying forest cover and subject to similar climatic conditions shows that with increasing forest area the retardation of river break up is increased. Data are presented on the break up of small river of the Vitka and Upper Volga basins with varying forest cover areas for 1947 (a year with abundant water), 1937 (a year with insufficient water) and 1948 (a year with an average amount of water). The effect is most marked during years with insufficient water. Graphs in the relationship of daily levels of water during the flood period show that in all years rivers with extensively forested basins snow melt is slowed down and the flood periods are delayed considerably because the break up is retarded. The effect of forest upon break up of small rivers depends upon climatic conditions which determine the beginning and intensity of snow melt. The height of the spring flood with partially forested basins is less than that in rivers flowing through fields as a result of the increased duration of the snow melt period. With increased forestation of basins the height of the flood waters increases but its duration also increases. By delaying the start of snow melt and reducing its intensity, the forestation of a basin influences the time of break up of small rivers. Also the dates of river break up depend upon the snow supplies. The relation between mean duration of spring break up of small rivers and degree of forestation for basins of small rivers (water catchments of 360 to 7000 km²) for European Russia is a straight line graph. When a river basin is 25% forested further increases of 5–6% delay river break up by one day. *Subject Headings:* **1. River ice break up 2. Forest influences on ice break up 3. Volga River, U.S.S.R.**—*I.L.D.*

## SYNOPTIC CLIMATOLOGY (551.589)

*See also:* **Synoptic climat., Soviet Far East** (Arkhangel'skiĭ), **12.3–8.**

12.3–443 551.589(679) 551.509.318

Vowinckel, E. (*Weather Bureau, South Africa*), **Ein Beitrag zur Witterungsklimatologie des südlichen Mozambiquekanals.** [Contribution to the weather climatology of the southern Mozambique Channel.] (In :Angola. *Serviço Meteorológico, Miscelanea Geofisica.* Luanda, 1956. p. 63–86. 8 figs., 7 tables, 6 refs. **DWB** (M (08) A592mi)—Several weather types of Lourenço-Marques are discussed and tables of their frequencies, durations and other characteristics are presented. Annual weather development is analyzed by means of 3-day averages and the principal singularities are indicated. *Subject Headings:* **1. Synoptic climatology 2. Weather types 3. Mozambique channel.**—*Transl. of author's abstract.*

12.3–444 551.589.1:551.581

Emsalem, René, **Les types de temps des climats chauds. Essai d'étude géographique à grande échelle.** [Weather types in hot climates. Attempt at geographical study on a large scale.] *Annales de Géographie*, Paris, 67(364):481–497, Nov./Dec. **1958.** 10 figs. **DLC**—First part of this article includes geographic definition of hot climates, examination of the equilibrium conditions of air and outline of circulation at inferior latitudes. The author indicates the general aspects of circulation at lower latitudes during the equinoctial seasons. It is composed of chains of connected tropical anticyclones and cyclonic cells. Intertropical front, tropical front, temperate front and trade-winds front are fundamental elements of circulation at these latitudes. Weather types of hot climates investigated on a large scale are more particularly bound to yearly displacement of tropical oceanic highs, seasonal change of trade-wind fronts and apparent motion of the sun. The author analyzes these various influences for the Northern Hemisphere and provides some remarks on the weather types in the Southern Hemisphere. *Subject Headings:* **1. Dynamic climatology 2. Weather types in hot climates 3. General circulation at lower latitudes.**—*A.V.*

12.3–445 551.589.1:551.515.8:551.513.1(468.5)

Font Tullot, I., **Le temps aux Iles Canaries.** [The weather in the Canary Islands.] *France. Météorologie Nationale, Notice d'Instructions Techniques, Sec. 17*, No. 14, **1958.** 12 p. Mimeo. Summary of the study **El tiempo atmosferico en las Islas Canarias** of I. Font Tullot (*see* 9.2–245, Feb. 1958, *Met. Abs.*)—Purpose of this study is to describe peculiarities of the weather conditions in the Canary Islands. First part deals with normal conditions and prevailing meteorological factors. It is constituted of an analysis of the general circulation in the lower and upper layers. The analysis of the general circulation is perfected by a careful study on the peculiarities of the inferior humid air layer and on the influence of relief on the various meteorological factors. In the second part the author investigates the main disturbances of normal conditions likely to affect the Canary Islands. He analyzes successively outbreaks of maritime polar air, cold lows, depressions originating in the polar front, easterly waves, depressions originating in the intertropical front and outbreaks of African warm air. *Subject Headings:* **1. Synoptic climatology 2. General circulation, Canary Islands 3. Atmospheric disturbances 4. Orographic influence 5. Canary Islands.**—*A.V.*

# MISCELLANEOUS

## COSMIC INFLUENCES (551.590)

*See:* **Sec. C1**, p. 454, **Sec. C2**, p. 457; **Solar influences on ionos.** (Chapman), 12.3–120; **Solar influences on ionos.** (Haubert), 12.3–121.

## VISIBILITY (551.591)

*See:* **Visibility measurement** (Früngel), 12.3–237; **Airport visibility** (Stevens et al.), 12.3–238; **Index of opacity** $N$ (Miurk), 12.3–309.

## ELECTRICAL PHENOMENA (551.594)

*See:* **Sferics** (Haubert), 12.3–121; **Thunderstorm-sporadic E ionization relationships** (Rastogi), 12.3–125; **Ionization maps** (Rawer), 12.3–126; **Radio echo polarization** (Satyanarayana), 12.3–127; **Polar blackouts** (Hakura), 12.3–134; **Atmos. elec. stations** (Mühleisen), 12.3–228; **Lightning detection**, 12.3–239; **Fragmentation and electrification of freezing water drops** (Mason, Maybank), 12.3–371; **Nuclei as connecting link in meteorological-electrical relations** (Israël), 12.3–373.

# PART II. BIBLIOGRAPHY ON LIMNOLOGY

Compiled by: *Andrew Meglis*

## INTRODUCTION

Limnology, the science of lakes, ponds, bogs, reservoirs and inland water, requires the attention of physicists, chemists, geologists, hydrologists, geographers and meteorologists, as well as biologists, and embraces problems analogous to those encountered by oceanographers.

A great deal of work has been done on Limnology for half a century in Germany, Austria and Switzerland, and for 20 or 30 years in the U.S.S.R., Finland and the U. S., where bogs, lakes and reservoirs play an important role in the conservation and use of natural water resources. During the past 2 or 3 years the continental Chinese have organized a comprehensive program for study and utilization of ponds, bogs, lakes and reservoirs for scientific and economic reasons.

It would be impossible to publish an exhaustive bibliography on Limnology in the limited space and time afforded this publication. However, since a large number of abstracts on aspects of Limnology of interest to meteorologists and hydrologists have accumulated during the past 3 or 4 years, it was thought that a perspective of recent work in this field could be gained by publishing these abstracts in one organized group rather than scattered throughout a number of issues in the Current Abstracts section. A few of the major works of former years and many published in Meteorological Abstracts during the past decade are included in order to make the compilation more representative of the scope and breadth of the research and data available in the published literature.

A systematic subject outline and an alphabetical listing of nearly 100 lakes, reservoirs, etc., referred to in the abstracts, is included to give at a glance an idea of and a key to the content of the material. A systematic geographic outline is also provided in order to give a birds'-eye view of the extent and quantity of work reported from various parts of the earth. It can be seen that emphasis has been placed on the physical rather than the biological aspects of limnology.

For further references the reader should consult the following excellent textbooks:

Hutchinson, G. E. **Treatise on limnology,** 1957. 1015 p. **12C-102**
Welch, P. S. **Limnology,** 2 ed. 1952. 538 p. **12C-260**
Blizniak, E. V. **Vodnye issledovania.** (Water investigations.) 1952. 5 ed. 651 p. **12C-17**
Rossolimo, L. L. **Temperaturnyĭ rezhim ozera Baikal.** (Temperature regime of Lake Baikal) 1957. 551 p. **12C-188**
Langlois, T. H. **The western end of Lake Erie and its ecology.** 1954. 479 p. **12C-130**

Two popular-scientific books of high quality are:

Vercelli, F. **Il mare, i laghi, i ghiacciai.** (Oceans, lakes, glaciers.) 1951. 622 p. **11B-152**
Vereshchagin, G. Iu. **Baikal: nauchno-populiarnyi ocherk.** (Lake Baikal: Popular scientific sketch.) 1949. 226 p. **12C-250**

Two bibliographies of first importance are:

Verber, J. L. **Bibliography of physical limnology,** 1781-1954. 1955. 57 p.
Strong, R. **Bibliography on lake ice.** 1948. 88 p. **12C-226**

Finally three serials which are essentially limnological are:

**Gewässer und Abwässer.** Vol. 1, 1953. **12C-83**
**Limnology and Oceanography,** Baltimore. Vol. 1, 1956. **12C-137**
**Limnologia e oceanologia sinica,** Peking. Vol. 1, 1959.

MALCOLM RIGBY, *ed.*

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**12C–1** 551.**573**:551.481.1(792)

Adams, Thomas C., **Evaporation from Great Salt Lake.** *American Meteorological Society, Bulletin,* 15:35–39, **1934.** 2 tables. **DLC**—Report of experimental studies of evaporation from Great Salt Lake, considering open surface of lake and effect of salt content. The more peculiar aspects of evaporation of this water are discussed. Small table gives total annual averages. (*Same item as* K–41, Oct., 1950, *Met. Abstracts.*) *Subject Headings:* **1. Evaporation 2. Lakes 3. Great Salt Lake 4. Utah.**

**12C–2** 551.**573**:551.481.1:551.491.5

Agupov, A. V., **Raschet velichiny podzemnogo stoka i ispareniia s ozer metodom vodnogo balansa.** [Calculation of the magnitude of underground runoff and evaporation from lakes using the water balance method.] *Vsesoiuznyi Gidrologicheskii S"ezd, Trudy* [Proceedings of the 3rd All Union Hydrological Conference, Oct. 1957], Vol. 4, issued **1959.** p. 207–210. fig., 5 refs., eq. **DWB** (M79 V985tr)—The method of water balance is considered best for computation of underground outflow (seepage losses) for reservoirs wide than 200 m. The method is discussed and its application on several lakes in the U.S.S.R. shows that several lakes considered to be without an outflow, have in reality important underground outflows. The method also shows that evaporation computing from formula is not exact; water balance method is more adequate. *Subject Headings:* **1. Underground runoff calculations 2. Evaporation calculations 3. Lake dynamics 4. U.S S.R.** —*J.N.*

**12C–3** 551.579 551.**577**:551.**573**(26)

Agupov, A. V., **Ozera-pokazateli izmereniia uvlazhneniia territorii rechnykh basseĭnov.** [Lakes as indicators of water balance changes in river basins.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geograf,* No. 1:48–60, Jan./Feb. **1958.** 5 figs., 9 refs., eqs. **DWB.** Transl. into English in the corresponding number of the *Akademiia Nauk SSSR, Bulletin of the Academy of Sciences, USSR, Geophysics Series.* **DLC**—Complex graphical analysis of the variations in water level of the Caspian Sea, Lake Baikal, the Ob River, and graph and data for Lake Argaiash (1933–54) are presented and discussed. Underground sources complicate the calculations of input from surface (river) runoff in some of these lakes, but the runoff of rivers is the most important long-run factor (since precipitation and evaporation on the lake itself are more constant), hence the lake level can be used as an indicator of the seasonal or annual runoff of rivers emptying into the lakes. Theory and calculations are elaborated in the text. *Subject Headings:* **1. Water balance of river basins 2. Lake level indicators of runoff 3. River basin studies 4. Caspian Sea 5. Lake Baikal, Siberia 6. Lake Argaiash.**—*M.R.*

**12C–4** 551.481.1:551.324.86(481)

Aitkenhead, N. (*Univ. of Durham Explor. Society, King's College, Newcastle*), **Observations on the drainage of a glacier-dammed lake in Norway.** *Journal of Glaciology*, Cambridge, 3(27):607–609, March, **1960.** table, ref. English, French and German summaries p. 607. **DWB, DLC**—The behavior of a Norwegian glacier-dammed lake, before, during and after drainage in 1957 is described. The evidence of former shoreline terraces is interpreted and possible drainage mechanisms are discussed. *Subject Headings:* **1. Glacial lakes 2. Norway.**—*Author's abstract.*

**12C–5** 551.481.1:551.573:551.521:551.513.1

Ångström, Anders K., **Applications of heat radiation measurements to the problems of the evaporation from lakes and the heat convection at their surfaces.** *Geografiska Annaler*, 3, **1920.** 16 p. 5 tables, 14 refs., eqs. **DWB**—Evaporation from Lake Vassijaure in summer determined and theoretical values are applied to the problem of convection of heat from sea surfaces. Indicated that there must be a balance of energy between the insolation absorbed by a body of water and the energy exchanges due to radiation, convection, conduction, and the latent heat of evaporation, and that evaporation might be determined by measuring the components of this equilibrium. (*Same item as* K–7, Oct. 1950, *Met. Abstracts.*) *Subject Headings:* **1. Evaporation 2. Lake surfaces 3. Heat exchange 4. Finland.**

**12C–6** 551.584.33 551.511.33:551.524.4:551.526.8

Antal, Emánuel, **A tavak légterének meteorológiai vizsgálata.** [Meteorological investigation of the atmosphere over lakes.] *Időjárás*, Budapest, 63(5):308–309, Sept./Oct. **1959. DLC**—This is a report summarizing 13 studies published recently by the Geophysical Observatory, Leningrad, (Vol. 78) dealing with the meteorological investigation of the atmosphere above lakes. Sevan and Balkhash, in the Caucasus, during the summer 1956 (*see* 12C–39, –115, –116, –117, –148 and 12.6–232 to –234). The process of the heat and humidity exchange and the air currents were thoroughly examined. The author gives detailed information about the methods used. Concludes that observations on the change of temperature up to 1000 m altitude are of great importance. *Subject Headings:* **1. Microclimatology of lakes 2. Heat exchange over lakes 3. Caucasus, U.S.S.R.**—*E.K.*

**12C–7** 551.324.86:551.481.1

*†Arnborg, Lennart, **Hydrology of the glacial river Austurfljót.** (Ch. 7 of Pt. 2 of Hjulstrom, Filip; Sundborg, Åke; Arnborg, Lennart and Jónsson, Jón: **The Hoffellssandur; a glacial outwash plain.**) *Geografiska Annaler*, Stockholm, 37(3/4):185–201, **1955.** 9 figs. (incl. photos), 9 tables, 4 refs. Also his: **Ice-marginal lakes at Hoffellsjökull.** (Ch. 8 of Pt. 2, *Ibid.*, 37(3/4):202–233, **1955.** 29 figs. (incl. photos), 2 tables, 30 refs. on p. 229–232, Jónsson, Jón: **On the formation of frontal glacial lakes.**) **DLC**—In Ch. 7, with the aid of numerous photographs, maps and graphs, the author describes the Hoffellsjökull Glacier, the frontal glacial lakes bordered by moraines, ice-dammed lakes, variations of the glacial tongues and the development of the frontal glacial lakes. In Ch. 8, the author discusses the river work beneath a glacier and its role in the formation of frontal glacial lakes, with special reference to Hoffelslön, Hoffellsjökull and Austurfljót, Iceland. *Subject Headings:* **1. Glacial lake formation 2. Glaciation 3. Hoffellsjökull Glacier 4. Iceland.**—*I.L.D.*

**12C–8** 551.579 551.481.1(285)

*Ayers, J. C. (*Cornell Univ.*); Anderson, D. V. (*Ontario Dept. of Lands and Forests*); Chandler, D. C. and Lauff, G. H. (*both, Mich. U.*), **Currents and water masses of Lake Huron: 1954 synoptic surveys.** *Ontario. Dept. of Lands and Forests. Div. of Research, Research Report*, No. 35; Feb. **1956.** 101 p. 48 figs., 13 tables, plus numerous tables in appendix, 7 refs. (Also on cover: *Michigan. Univ. Great Lakes Research Institute, Ann Arbor, Technical Paper*, No. 1.) **DWB** (M79 A977cu)—During the summer of 1954, three synoptic surveys, involving more than 80 stations each, were made on June 28 and 29, July 27 and Aug. 25. Elements recorded were temp., magnesium, silicon, calcium, conductivity (horizontal and vertical), horizontal transparency, relative humidity and drift currents at surface and bottom. Equipment, results of analyses, as well as the raw data and analyzed data, are presented in text and in tables, charts, graphs, etc., respectively. Water masses from Lake Michigan and Lake Superior, as well as from Lake Huron, are identified at the surface and along the bottom, where possible. The cooperative international project involved 5 Canadian and 6 U. S. vessels. (*Same item as* 10.8–23, *Met. Abstracts.*) *Subject Headings:* **1. Limnological surveys 2. Lake Huron.**—*M.R.*

**12C–9** 551.481.1

*Ayers, John C.; Chandler, David C.; Lauff, George H.; Powers, Charles F. (*all, Mich. Univ.*) and Henson, E. Bennette (*Univ. of Md.*), **Currents and water masses of Lake Michigan.** *Michigan. Univ. Great Lakes Research Institute, Publication,* No. 3, **1958.** 169 p. 52 figs., 12 tables, numerous tables in appendix, eqs. Summary p. 115. **DWB**—This report contains the results of various cruises conducted recently on Lake Michigan as a continuation of the investigations begun by the Great Lakes Research Institute in 1954. The report covers the four cruises; the data are included in the appendices and a complete discussion is given of the results of the investigations. The results have indicated new features hitherto unknown about the lakes. A method of vector plots of wind stresses is developed for the studying of the relation of wind currents observed here. *Subject Headings:* **1. Lake currents 2. Lake expeditions 3. Expeditionary data 4. Lake Michigan.**—*N.N.*

**12C–10** 551.482.214.78

Baranov, V. A. and Popov, L. N., **Issledovaniia vodno-solevogo rezhima i balansa Karlovskogo vodokhranilishcha.** [Investigations of the water-salt regime and balance of the Karlovsk reservoir.] *Vsesoiuznyĭ Gidrologicheskiĭ S''ezd, Oct. 1957, Trudy,* Vol. **10**, issued **1959.** p. 112–122. 3 figs., 4 tables, 7 eqs. **DWB**—The plan of the Karlovsk water reservoir is described with the aid of a diagram and the procedures for investigating the water balance of this reservoir and its salt regime are outlined with the aid of the relevant equations. Data in the form of tables and graphs are presented on the water balance of the Karlovsk reservoir for each year of the period 1935–1956, salt flow into the reservoir (1935–1939), amount of salt deposited on the banks (during drop in level) and conversely arriving into the reservoir (during rise in level), etc. *Subject Headings:* **1. Water balance of reservoirs 2. Salinity data 3. Karlovsk water reservoir 4. U.S.S.R.**—*I.L.D.*

**12C–11** 551.326.85:551.481.1(798)

Barnes, David F. (*U. S. Geological Survey*), **Preliminary report on Lake Peters, Alaska ice studies.** *U. S. Air Force. Cambridge Research Center, GRD Research Notes,* No. 29, Dec. **1959.** p. 102–110. 2 figs., table, 7 refs. **DWB**—A discussion of heat budget measurements, ice thickness, elastic modulus of ice, ice strength and structure of ice. The purpose was to study the decay of ice strength as the melting season progressed. Differences between ice with horizontal and vertical c-axes, shown in table form, suggest that ice with vertical c-axis maintains its strength and thickness longer than the other. Solar radiation appears to be the major cause of the decay. Conventional field measurements of strength are inadequate. No clear field criteria have been established for estimating when an ice landing strip may be used. *Subject Headings:* **1. Heat budget of lakes 2. Lake ice studies 3. Ice crystallography 4. Lake Peters, Alaska.**—*E.Z.S.*

**12C–12** 551.481.1:551.491.48

†Beach, Neil W. (*Gettysburg College, Pennsylvania*), **Study of the planktonic rotifers of the Ocqueoc River system, Presque Isle County, Michigan.** *Ecological Monographs,* Durham, N. C., 30(4):339-357, Oct. **1960.** 9 figs., table, 40 refs. **DLC**—The objectives of this study were: (a) comparison of the qualitative and quantitative aspects of the separate rotifer faunas in each of the discrete lotic and lentic habitats of the Ocqueoc River system; (b) analysis of the differential effects of stream and impoundment conditions, natural or otherwise, on both autochthonous and rotiferan faunas; and (c) determination of those factors, whether physical, chemical, biological or combinations thereof, which might be responsible for the development and maintenance of any autochthonous rotifer fauna in the system. The investigation was carried on from 1952 through the summer of 1955. Both living and preserved plankton samples were examined, and preserved samples totaled 534 from 42 field station throughout the system. Quantitative samples were obtained from all significant lakes and from 23 stations in the river. The Lake Nettie and Ocqueoc Lake areas were sites of more detailed study. Selected physico-chemical data were taken simultaneously with plankton collections. (Data are graphed and tabulated throughout the article.) *Subject Headings:* **1. Ecological studies 2. Planktonic rotifers 3. Ocqueoc River, Mich.**—*Author's summary.*

**12C–13** 551.481.1:551.491.48

Bekman, M. Iu., **Ozero Zagli-Nur.** [Lake Zagli-Nur.] **Akademiia Nauk SSSR. Vostochno-Sibirskiĭ Filial, Irkutsk, Trudy Baikal'skoĭ Limnologicheskoĭ Stantsii,** Vol. 17:520–530, **1959.** fig., 5 tables, 16 refs. **DWB** (551.48 A313is)—This Lake is located on the southern end of Olkhon Island in Lake Baikal and long ago it was connected with the Maloe More (Little Sea), but recently was cut off by sand deposits. The main purpose of the study of this lake is to arrange for experimental acclimatization of new species of fish (ripus, sazan). Climatological and geological conditions in the lake region are described with details and tabulated data. Attention is given to the water analysis and oxygen content sustained under ice during winter. The replacement and saturation by oxygen is accounted for by the noninterrupted photosynthetic activities of certain vegetation under transparent clear ice. With the ice covered by snow these activities are considerably reduced. Various types of planktonic algae (seaweeds) are described with characteristics of their behavior under ice. Previous investigations on the hydrobiology of the lake are reviewed with reference to various forms of copepades, clodocers, gammarides, rotiferas (*karatella gnadata, k. cochlearis*, etc.) and other species, which are described in the text with tabulated data. Various types of fish (perch, sores, pike, dace, bullhead, etc.) are described with reference to their life, growth and reproduction. In concluding this complex study, the author considers expanding the program to include investigation of Lake Baikal conditions by new methods. *Subject Headings:* **1. Limnological studies 2. Hydrobiology 3. Hydrogeology 4. Lake Zagli-Nur, Siberia.**—*N.P.S.*

**12C–14** 551.481.1

Berdennikov, V. P., **O mekhanizme podtiagivaniia glubinnykh vod Baikala v istoke Angary.** [Mechanics of the drawing up of bottom water in Lake Baikal at the source of the Angara River.] *Leningrad. Gosudarstvennyĭ Gidrologicheskiĭ Institut, Trudy*, No. 72:33–41, **1960.** 3 figs., 9 refs., 20 eqs. Russian summary p. 41. **DWB**—The mechanism of drawing up of the waters of Lake Baikal in the source of Angara River must be associated with the presence of stratified currents of water divided by boundary laminar layers. The conditions for the current are such as for these "heavy currents" of hydrodynamics, i.e., stratified currents with layers differing in velocity and viscosity as a result of temperature stratification. A theoretical analysis of dynamic conditions for a two-layer current with a boundary surface is carried and it shows that the distribution of velocities of flow is determined by the magnitude of velocity of the fundamental current and the product $\rho\mu$—fluid density and coefficient of viscosity. Periodic variations of water temperature in the lower waters of the Irkutsk hydroelectric station (periods of 85–125 sec) are explained by the presence of a current stratified with depth, since the periodicity is associated with vortices at the surface of separation resulting from instability of the latter for given conditions. *Subject Headings:* **1. Lake dynamics 2. Overturning of lake waters 3. Lake Baikal, Siberia.**—*I.L.D.*

**12C–15** 551.**579.4**:551.481.1:551.**583**(485)

Bergsten, Folke, **The duration of the waterstages of the Swedish lakes Vänern and Storsjön.** *International Union of Geodesy and Geophysics, Association of Scientific Hydrology, Oslo 1948*, [*Transactions*], 1:335–343, [1950?]. fig., 2 tables, 2 figs. **DWB**—Water level statistics for Lake Vänern (period 1807–1936). The lake has a ratio $r = 1:8$ between lake surface and catchment area and shows no seasonal variations. Data for Lake Storsjön given for the period 1893–1947, $r = L:26$; seasonal variations are well pronounced. Periodogram analysis for Lake Vänern gave periods of 11–12 years and about 36 years. *Subject Headings:* **1. Lake levels 2. Climate variations 3. Lake Vänern, Sweden 4. Lake Storsjön, Sweden.**—*A.A.*

**12C–16** 551.**573**:551.481.1(794)

†Blaney, Harry F., **Evaporation from and stabilization of Salton Sea water surface.** *American Geophysical Union, Transactions*, 36(4):633–640, Aug. **1955.** 2 figs., 7 tables, numerous refs. Also Rohwer, Carl; Cochrane, N. J. and Blaney, H. F., **Discussion. . . .** *Ibid.*, 37(6):786–788, Dec. **1956.** 2 tables, 5 refs., eqs. **DWB**—Since 1935 the water level in Salton Sea has been rising. Three evaporation stations bordering the sea were established to study the problem. An analysis of pan evaporation, gage heights and inflow measurements indicates that the annual evaporation from Salton Sea ranges from about 70 to 76 inches.—According to Rohwer the Salton Sea is rising faster than it should (according to water budget calculations). This is explained on the basis of slight inaccuracies in estimation of both inflow and evaporation. The factor for comparing pan evaporation varies by nearly 30%, depending on which factor is used. Cochrane estimates average evaporation from Salton Sea as 62″ per annum. (*Same item as* 7.3–221, 9.3–212 and 10K–55, *Met. Abstracts*.) *Subject Headings:* **1. Evaporation from lakes 2. Lake level variations 3. Salton Sea, Calif.**—*Authors' abstract and M.R.*

**12C–17** 551.48(02)

†Blizniak, Evgeniĭ Varfolomeevich, **Vodnye issledovania.** [Water investigations.] 5th ed. rev. and enl. Moscow, Izdat. Ministerstva Rechnogo Flota SSSR, **1952.** 651 p. 382 figs. (incl. maps, fold.), 16 tables, numerous bibliogs. **Meteorologicheskie i klimaticheskie raboty,** [Meteorological and climatological work, p. 240]. **DLC**—This is a substantial and exhaustive treatise on the hydrology of rivers, lakes, bogs, soil, etc., with full treatment of the geological, hydrometric, meteorological, geochemical, geobotanical, photogrammetric and other aspects of each. Meteorological stations, instruments and observations are treated on p. 240–263, meteorological applications to river hydrology on p. 536, and to lake hydrology on p. 577–579. Lake waves and seiches are treated on p. 562–573, and the thermal regime of lakes on p. 573–576. Ice in lakes is covered on p. 576–577 and in rivers on p. 219–238, and waves in rivers on p. 239 (extensive bibliography at end of each chapter). The author is more concerned with the measurement of parameters and compilation of

data than with forecasting. (*Same item as* 8.1–9, *Met. Abstracts.*) *Subject Headings:* **1. Hydrology textbooks 2. Lake hydrology 3. River hydrology.**—*M.R.*

**12C–18** 551.579:551.588.6 551.579:631.15

Bochkov, A. P., **Vliianie raspakhannosti i mestnykh osobennosteĭ malykh vodosborov na stok v usloviiakh Severnogo Kazakhstana.** [Influence of ploughing and of local characteristics of small water collections for runoff under northern Kazakhstan conditions.] *Leningrad. Gosudarstvennyĭ Gidrologicheskiĭ Institut, Trudy,* No. 68:50–85, **1959.** 7 figs., 7 tables, 2 charts, 11 refs. **DWB**—Modern methods of agriculture, forest amelioration and economic utilization of large areas of virgin and fallow lands are discussed with a view to possible modification of the hydrological conditions of rivers and runoff. Various works of different investigators are reviewed and discrepancies in their conclusions are related to different hydrological conditions and numerous physico-geographic factors, acting differently at different times and places. Agrotechnical measures, in zones with excessive moisture, are adopted for removing runoff and also in the case of dry zones for withholding snow, thawing and rain water on the ground. 105 water samples from rivers of northern Kazakhstan representing different geographic zones, territorial distribution types of soil, topography and degree of development of hydrographic systems are analyzed. Attention is also given to the role of autumn precipitation and water content in snow in the formation of spring runoff, illustrated by many curves. The appendix contains ten pages of tabulated data on the spring runoff in various localities of northern Kazakhstan for the period 1955–56 and annual runoff for period 1933–1956. *Subject Headings:* **1. Runoff variations 2. Agricultural hydrology 3. Kazakh S.S.R.**—*N.P.S.*

**12C–19** 551.482.215.78

Bochkov, N. M., **Osnovnye polozheniia metodiki prognozov kachestva vody v vodokhranilishchakh.** [Main principles of the method of forecasting the quality of water in a reservoir.] *Vsesoiuznyĭ Gidrologicheskiĭ S''ezd, Oct. 1957, Trudy,* Vol. 10, issued **1959.** p. 129–134. 2 eqs. **DWB**—The author discusses the evaluation of the quality of water in a reservoir based upon a scientific theory of (1) the formation of the chemical composition and water regime of the flow of water into the basin supplying the reservoir; and (2) the stage of variation of the chemical composition and regime of flow under the influence of the accumulations in the reservoir. The first stage involves studies on the hydrological regime and corresponding chemical analyses, and the second stage involves the hydrological processes associated with the formation of the reservoir dam (submergence of flood areas, formation of stagnant water areas, leaching of salts from the bottom, etc.); the regulation of river flow which causes seasonal or long period equalization of water in the reservoir; salting and desalting resulting from differences in length of regulation period, etc. These conditions lead to the development of particular physical, chemical and biochemical processes, such as accumulation of solid matter in the dam, precipitation of rather insoluble salts, variation in water turbidity and in water color, biochemical decomposition of organic deposits, etc. The variation in the composition of the chemical regime of the reservoir for any given time interval is expressed in the form of the equation of salt balance. A simplified method of computing mineralization from water salt balance without taking into account chemical and biochemical processes within the reservoir, is given by the equation

$$S=(S_l+{}_{riv}+S_{pr})-(S_e+S_{of}+S_f\pm S_{og})$$

where $S_l$ = dissolved substances in reservoir water at the beginning of the calculation period; $S_{riv}$ = influx of material with the river discharge into the reservoir; $S_{pr}$ = incoming material with atmospheric precipitation; $S_e$ = outflow of material with water taken from the reservoir; $S_{of}$ = outflow of substances with water propelled through reservoir installations; $S_f$ = outflow inflow of substances with filtering water; $S_{og}$ = outflow and return of substances during the formation of ice cover and during melting. The use of this procedure in forecasting quality of reservoir water is discussed. *Subject Headings:* **1. Quality of water in reservoirs 2. Forecasting quality of reservoir water.**—*I.L.D.*

**12C–20** 551.526.8(47)

Bogoslavskiĭ, B. B., **O termicheskom rezhime ozera Glubokogo v bezlednyĭ period.** [Thermal regime of Lake Glubokoe during nonglacial period.] *Voprosy Geografii,* Moscow, No. 26:96–117, **1951.** 7 figs., table, refs. p. 116–117, 5 eqs. **DLC**—Temperature observations have been carried out since 1907, with interruptions. Observations from May to Oct. 1946 are discussed in detail, giving a complete picture of different thermal processes involved, computing the march of heat reserve, mean temperature, stability, work necessary for heating the lake from 4°C to the given temperature. Work of wind and turbulent exchange are calculated. Comparisons are made with Lakes Luntskoe and Beloe. (*Same item as* 5.2–151, Feb., 1954, *Met. Abstracts.*) *Subject Headings:* **1. Lake temperatures 2. Lake Glubokoe, U.S.S.R.**—*A.A.*

12C-21 551.481.1:551.588

†*Botvay, Károly, **Adatok a tavak és folyók parti környezetének éghajlatához.** [Contributions to the knowledge of climate of the shores of lakes and rivers.] *Időjárás*, Budapest, 56(5/6):131–144, May/June **1952.** 7 figs., tables, 12 refs. Russian and French summaries p. 197–198. **DWB**—Micrometeorological measurements made by the author with a view to determining the influence of large masses of water on immediate off-shore surroundings are reported. The measurements were carried out during several weeks in Aug.–Sept. 1949 near Lake Balaton and on Sept. 25, 1949 near the Danube. A portable Assmann type aspiration psychrometer and an anemometer were used and values were obtained for temperature, humidity, wind and cloudiness. Minute descriptions are given of sites and measuring methods and results are tabulated and presented in graphs. It was found that humidity is increased and rise in temperature moderated in the vicinity of a lake or river, especially during near-zenithal positions of the sun. (*Same item as* 4.6–227, *Met. Abstracts.*) *Subject Headings:* **1. Coastal climates 2. Lakes and rivers 3. Micrometeorological data 4. Lake Balaton, Hungary 5. Danube River, Hungary.**—*G.T.*

12C-22 551.526.8(98)

Brewer, Max C. (*U. S. Geological Survey, Menlo Park, Calif.*), **The thermal regime of an Arctic lake.** *American Geophysical Union, Transactions*, 39(2):278–284, April **1958.** 10 figs., 6 refs. **DWB, DLC**—Much of the Arctic coastal plain in Alaska is covered by shallow lakes. Those in the Barrow area, which are believed to be representative of most of the lakes in the coastal plain, are generally either two to three feet or six to nine feet deep. The shallow lakes can often provide a suitable summer water supply, but only the deeper lakes provide a significant water supply throughout the year. The water in the individual lakes is in an essentially isothermal state during the ice-free period that lasts from late June until September. The maximum temperature recorded in a lake near Barrow in 1954 was about 12°C. When ice formation begins, the temperature of the body of water as a whole may be only a few tenths of a degree above 0°C. Once the lake surface is iced over, the water temperatures may rise rapidly as much as 2°C, apparently owing to radiated heat received through the ice. The heating is terminated by a sudden cooling that coincides with the covering of the ice by a thin blanket of snow. This cooling is followed in turn by a second warming of the bottom and near-bottom water that takes place gradually over a period of weeks. The bottom sediments beneath the lake are the source of heat. The magnitude of the second rise and the time during which it takes place depend on the distance from shore and the depth of water. A gradual cooling takes place during the balance of the winter. Permafrost underlies the shallow lakes but an unfrozen basin several hundred feet deep may extend beneath the deeper lakes. (*Same item as* 10.3–52, *Met. Abstracts.*) *Subject Headings:* **1. Thermal regime of lakes 2. Lake temperatures 3. Arctic lakes 4. Barrow, Alaska 5. Arctic.**—*Author's abstract.*

12C-23 551.579.4:523.74

Brooks, C. E. P., **Variations in the levels of the Central African lakes Victoria and Albert.** *Great Britain, Meteorological Office, Geophysical Memoirs*, 2(20):337–344, **1923.** fig., 7 tables. **DWB**—Means of maximum and minimum readings of lake gages at Kisumu, Lake Victoria, 1896–1921 and rainfall of Uganda are correlated with monthly sunspot numbers. The partial correlation lake levels-sunspots (rainfall eliminated) is +.72, lake levels-rainfall (sunspots eliminated) only +.25, showing that evaporation is more important than rainfall in determining lake level. For 1902–1921, for which the data are more reliable, the figures are +.82 and +.39. Level of Lake Albert also agrees with sunspot numbers. (*Same item as* 8A–85, *Met. Abstracts.*) *Subject Headings:* **1. Lake level variations 2. Sunspots 3. Lake Victoria, Africa.**

12C-24 551.582(285:71:73)

Bruce, J. P. (*Hydromet. Section, Canadian Met. Branch*), **Great Lakes research.** *Conference on Great Lakes Research, 3rd, Ann Arbor, Mich. May 6–7, 1959, Proceedings*, pub. **1960.** p. 3–8. fig., table, 11 refs. **DWB** (M82/779 C748pr)—A progress and status report on the Canadian Meteorological Branch Activity in the Great Lakes area. Its present and immediately foreseeable program of interest to Great Lakes investigators will be largely in collaboration with the Great Lakes Geophysical Research Group or its successor. It involves: (1) extension of observation network to include more shore and island stations and additional ships; (2) instrumental work on automatic weather stations and their potential applicability as weather buoys, as well as testing and development of meteorological instruments for use on the research vessel; (3) research studies and data analyses. It is planned to tackle the problem by climatological analyses of photographed weather radar patterns. *Subject Headings:* **1. Great Lakes research 2. Meteorological research facilities 3. Great Lakes.**—*E.Z.S.*

12C-25 551.579:551.481.1:551.526.8:551.577.37

Bryden, Robert R., **Ecology of *Pelmatohydra oligactis* in Kirkpatricks Lake, Tennessee.** *Ecological Monographs*, Durham, N. C., 22(1):45-68, Jan. **1952.** graphs, tables, refs. **DLC**—Table shows changes in $CO_2$, $O_2$, acidity and alkalinity, temperature of air and water in lake following period of heavy rainfall. Seasonal differences due to rains or melting snow are noted: rain water from surrounding land brings in considerable $CO_2$, but alkalinity is only temporarily disturbed after heavy rain. Water temperature fluctuations were recorded for 1948 and 1949. (*Same item as* 4.7–164, *Met. Abstracts.*) *Subject Headings:* **1. Limnology 2. Lake temperatures 3. Excessive rainfall 4. Rainfall effects 5. Ecology 6. Kirkpatricks Lake, Tenn.**—*M.R.*

**12C–26** 551.468.2:551.583.14

Budyko, M. I. and Iudin, M. I., **O kolebaniiakh urovnia neprotochnykh ozer.** [Oscillations of the level of stagnant lakes.] *Meteorologiia, i Gidrologiia*, Moscow, No. 8:15–19, Aug. **1960.** 3 refs., 17 eqs. **DWB, DLC** (QC851.M27)—Previous authors have tried to correlate variation in the water level of inland seas with possible climatic variations. This paper deals with the statistical problem of deriving criteria for determining whether the observed variations could be due to random fluctuations in the elements of the water balance caused by the randomness of the atmospheric circulation. The criteria obtained are applied to data of the variation in level of the Caspian Sea. This suggests that these variations could be explained by randomness which is a conclusion contrary to the work of some previous authors. *Subject Headings:* **1. Climatic variations 2. Lake level variations 3. Caspian Sea.**—*R.B.*

**12C–27** 551.5:061(285:73)

Burke, H. N. (*W. B. Airport Station, Cleveland Airport*), **Weather and the Great Lakes.** *Inland Seas*, Cleveland, Ohio, 13(2):138–141, Summer **1957. DWB** (M82/779 B959w)—A general discussion of the Weather Bureau service to shipping and to residents of the Great Lakes area, and of the effect of the Lakes on the climate or weather of the area. *Subject Headings:* **1. Great Lakes meteorological services 2. Lake effects 3. Great Lakes, U. S.**—*M.R.*

**12C–28** 551.583.3:551.461.2

Butler, Patrick, **Palynological studies of the Barnstable Marsh, Cape Cod, Massachusetts (Abstract).** *Ecology*, Durham, N. C., 40(4):735–737, Oct. **1959.** fig., table, 3 refs. **DWB, DLC**—"This paper Patrick Butler (deceased) prepared by Elso E. Barghoorn and Alfred C. Redfield, Harvard Univ."—Describes the palynological history of the Barnstable Marsh in eastern Massachusetts. According to studies, the Marsh began forming about 5000 years ago. Evidence shows that climate in the region was warmer 5000 years ago. The age of the lowest peat is 5500 years. According to calculations the sea level has risen by 29 ft in the last 5000 years in that part of the North Atlantic giving an average of 6 or 7 in. per century. *Subject Headings:* **1. Climatic variations 2. Sea level changes 3. Barnstable Marsh, Cape Cod, Mass. I. Barghoorn, Elso E. II. Redfield, Alfred C.**—*A.H.K.*

**12C–29** 551.481.1:532.594

Caloi, P. and Giorgi, M., **Sulle oscillazioni libere del lago di Albano.** [Free oscillations in Lake Albano.] *Annali di Geofisica*, Rome, 5(2):247–255, April **1952.** 4 figs., 5 refs., 12 eqs. Italian and English summaries p. 255. **DLC**—The practical application of Crystal's method for determining physical elements (displacements and periods) of the seiches of Lake Albano is discussed. The results obtained are in fair agreement with those determined by other methods. Highest vertical and horizontal amplitudes occur where smaller depths are observed, which confirms the theory. *Subject Headings:* **1. Seiches 2. Lake Albano, Italy.**—*Authors' abstract.*

**12C–30** 551.481.1:532.594

Caloi, P. and Spadea, M. C., **Le sesse del Lago di Garda.** [Seiches in Lake Garda.] *Annali di Geofisica*, Rome, 6(4):451–465, Oct. **1953.** 7 figs., 3 tables, 6 refs., eqs. **DLC**—This report concerns the results of an extensive research, intended to explain the complex of free oscillations which are registered at Peschiera, at the base of the eastern basin of Lake Garda. Among these oscillations, there was one of particular interest which had a period of about 30 m. The physical explanation of this seiche has remained controversial for more than forty years. This research has shown clearly that such an oscillation is not at all bi-nodal in the whole lake as maintained by DEFANT, but concerns only a part of the gulf of Peschiera-Garda, from which this fundamental oscillation is formed. This is analogous to the corresponding oscillation, of equal period, which moves the northern part of Garda, as is shown by the registrations obtained at Riva. Some final considerations refer to the probable origin of the free oscillations which are registered at Peschiera. *Subject Headings:* **1. Seiches 2. Lake Garda, Italy.**—*Authors' abstract.*

**12C–31** 551.481.1:532.594

Caloi, P. and Spadea, M. C., **Le sesse del lago di Como, Pt. 1.** [Seiches of Lake Como, Pt. 1.] *Annali di Geofisica*, Rome, 11(3/4):191–198, July/Oct. **1958.** fig., 3 tables, map (fold), ref. English and Italian summaries p. 198. **Pt. 2.** *Ibid.*, 12(4):489–496, Oct./Dec. **1959.** map (fold), 2 tables, 3 refs., 7 eqs. Italian and English summaries p. 495. **DWB, DLC**—Pt. 1: In view of the particular configuration of Lake Como and as the Lecco Branch appears to be a natural continuation of the upper part of the Lake, we have viewed its ensemble as a basin with movements of its own even if influenced by the branch which begins at Como. During the present initial stage of research concerning the free oscillations of this interesting Lake, we have limited ourselves to the determination of periods, knots and amplitudes that should be expected between Gera and Lecco. Naturally, the research will subsequently be extended to the whole basin. Pt. 2: Figures ranging from 38 m to 40 m were obtained for the uninodal by application of two different methods to the whole lake. As the oscillation from Gera to Lecco has reached about 39 m, speaking from a hydrodynamic point of view, both oscillations can take place, i.e., the one that concerns the whole lake and the other that is limited to the Lecco branch and its extension. *Subject Headings:* **1. Seiches 2. Lake Como, Italy.**—*Authors' abstract.*

**12C-32** 551.481.1:532.59:001.4

Caloi, Pietro, **Termologia del lago di Bracciano: onde interne.** [Thermology of Lake Bracciano: internal waves.] *Annali di Geofisica*, Rome, 12(1):1–19, Jan./March **1959.** 23 figs., 6 tables (fold.), 4 refs. **DWB, DLC**—The study of Lake Bracciano and especially of its thermology, undertaken a few years ago, has been continued. The temperature of its water has been taken frequently at various depths utilizing a specially designed and built bathythermograph. The data thus collected have already made it possible to outline the trends of the temperature of the water of the lake during the year and to confirm the fact that, during the period from July to November, a thermic-jump layer materializes in it. The base of this layer behaves like a discontinuity surface which practically divides the lake into two parts endowed with different density, which do not mix. This creates physical conditions which are necessary and sufficient to create the so-called "internal waves." Owing to the effect of external perturbing causes, the discontinuity surface becomes the seat of stationary movements whose periods are linked with morphologic features and density of the lake and whose amplitude is often considerable. As such waves disappear very rapidly towards the external surface, an opinion had spread that they could not be recorded at the surface as watery waves except in sporadic cases. In Lake Bracciano, instead, very long series of oscillations with their own period of 6 hours have been recorded at the surface. A theory has proved that such waves are the fundamentals (uninodals) of internal waves. The fact that they are registered, with unusual amplitudes, during whole weeks, can probably be attributed to a resonance phenomena which could be caused by earth tides deriving from quarter-day tides or half-day harmonics of the nearby Tyrrhenian Sea. *Subject Headings:* **1. Limnological investigation 2. Lake temperatures 3. Lake stratification 4. Bathythermographic data 5. Lake Bracciano, Italy.**—*Author's abstract.*

**12C-33** 551.506.9:551.326.8:551.481/2(71)

*Canada. Meteorological Branch, **Break-up and freeze-up dates of rivers and lakes in Canada.** Its *CIR*-3156, ICE-2, Jan. 30, **1959.** 92 p. mostly tables. **DWB, DLC**—Data for 87 rivers and 113 lakes, bays and harbors for 1 to 130 years includes dates on which ice first moved or broke, when water was ice-free, when ice first formed and when the body of water was completely frozen over. Meteorological records for nearby stations, newspaper files, records of power companies, public utilities, harbor commissions, transportation companies, government agencies, missions, the Royal Canadian Mounted Police and private companies and individuals were used. A regular program for reporting the freeze and breakup dates is now in effect and results will be published later. Means and extremes are given for all records of 10 years or more. (*Same item as* 11.2–85, *Met. Abstracts.*) *Subject Headings:* **1. Ice breakup 2. Freeze-up 3. River ice data 4. Lake ice data 5. Canada.** —*M.R.*

**12C-34** 551.579.4:551.481.1(931)

Carter, N. R. (*New Zealand*), **Lake Waikaramoana, New Zealand.** *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Brussels, 1951,* [*Transactions*], 3:385–399, 1952. 10 figs., 3 refs. **DWB**—Report on this lake, formed by a gigantic landslide, contains some remarks on rainfall (≈85″ per annum), runoff (≈600 cu feet/sec from 165 sq mi), and lake temperature. *Subject Headings:* **1. Hydrologic cycle 2. Lake hydrology 3. Lake Waikaramoana, New Zealand.**—*A.A.*

**12C-35** 551.482.213/4:551.481.1

†Cerny, Adolf (*Vienna*), **Über den Einfluss des Wetters auf den Stoffhaushalt im Teiche.** [The influence of weather upon the chemical balance of ponds.] *Wetter und Leben*, Sonderheft No. 1:55–80, May **1952.** 7 figs., 5 tables, 27 refs. **DLC**—After a detailed analysis of the physical, chemical and biological characteristics of a small pond, the author presents a comprehensive examination of the diurnal changes and the $CO_2$ content of pond water on clear, sunny days, on partly cloudy days and on rainy, murky days. *Subject Headings:* **1. Chemical balance of ponds 2. Weather effects on ponds.**—*I.L.D.*

12C–36 551.509.58:551.579:551.481.1

Chard, A. E., **Forecasting Powell Lake runoff.** *Western Snow Conference, 1956, Proceedings*, 24:11–12, Oct. **1956.** **DWB** (M06 W527p)—In forecasting runoff, three sources of data are used: snow surveys, records of precipitation at the townsite of Powell River, B. C., and long range weather forecasts. Based on snow surveys and precipitation records, a sample calculation of the runoff for 1956 is given. Long range weather forecasts aid in predicting the lake position. *Subject Headings:* **1. Forecasting lake runoff 2. Lake level calculations 3. Powell Lake, B. C.**—*I.S.*

12C–37 551.579(02) 551.481(02)

*Chebotarev, A. I., **Gidrologiia sushi.** [Land hydrology.] Ed. by V. I. Uryvaev. Leningrad, Gidrometeoizdat., **1955.** 396 p. 137 figs., photos, 61 tables, 16 refs., 105 eqs. **DWB** (M79 C514gi) —Review by V. M. Pavlov in *Meteorologiia i Gidrologiia*, Leningrad, No. 6:67, June **1956.** Transl. into English of the Review, available for reference. **DWB** (627 P3384bo)—This edition of the standard text on hydrology of continental waters and land consists of 56 chapters divided among 8 major headings: 1) basic concepts and history, 2) the hydrologic cycle, 3) underground waters, 4) lakes, 5) bogs, 6) glaciers, firn, etc., 7) rivers and 8) river runoff and flood calculations and forests. It is based on the latest Russian concepts and research in hydrology and hydrometeorology and is intended for students and practicing workers in these fields. The text is full of data, charts, nomograms and other illustrative material of a practical nature. (*Same item as* 9.5–7 and 11B–33 *Met. Abstracts.*) *Subject Headings:* **1. Hydrology textbooks 2. Hydrometeorological forecasting 3. Bogs 4 Lakes 5. Glaciers.**—*M.R.*

12C–38 551.481.1:551.577.3

†Chel'tsov-Bebutov, A. M., **Izmeneniia urovnia Naurzumskikh ozer.** [Variations in the levels of lakes in the Naurzum area.] *Moscow. Universitet. Uchenye Zapiski*, No. 170:159–176, **1954.** 5 figs., 2 tables, 20 refs. **DLC** (Q60.M868)—Naurzum Lakes in Kustanai Region have varied greatly in level and in extent, as have other lakes in Kazakhstan and vicinity. Graphs show variations in lake level compared with variations in precipitation at nearby stations (such as Naurzum, 1935–49) and smoother curves for 1820–1945 in north Kazakhstan, and 1700–1950 in western Siberia and north Kazakhstan. Snow cover is an important factor in the above, both as to depth and runoff. *Subject Headings:* **1. Lake level variations 2. Precipitation variations 3. Kustanai Region, U.S.S.R.** —*M.R.*

12C–39 551.481.1:551.553.1

Chestnaia, I. I., **Vozdushnye techeniia nad oz. Sevan.** [Air currents over Lake Sevan.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 78:65–76, **1958.** 14 figs., 4 tables, 2 refs. **DLC**—The atmospheric currents in the basin of Lake Sevan were investigated with the aid of pibal observations of existing stations and supplementary aerological observations at stations of Lake Sevan, Shorzha, etc., established during the expedition in which the author participated. With the aid of data presented in graphs and tables, the author discusses the diurnal variations of wind velocities and mean vertical wind profile at different times of the day at Lake Sevan stations, daily variation of wind velocities at different altitudes, etc. It is concluded that the wind regime of the lake basin is determined by the interaction of several atmospheric currents. Depending on the intensity of these currents and their vertical and horizontal extension different vertical wind distributions arise in the basin. During July–August 1956 the following currents prevailed: northern current of Little Sevan, strongly marked over Lake Sevan station, included a rather thin but extended layer; its effect was evident sometimes at the Martuni stations; easterly current over Mazva stations extended over a large part of the lake. The westerly and southwesterly currents were observed aloft over all the stations. *Subject Headings:* **1. Wind variations over lakes 2. Lake Sevan, Armenian S.S.R.**—*I.L.D.*

12C–40 551.582.1:551.481.1(58)

Chistovskiĭ, O. G., **Zabal'nye ozera Pamira.** [Landslide lakes of Pamir.] *Priroda*, Moscow, No. 10:83–91, Oct. **1952.** 7 figs. **DLC**—Geographic description with a brief discussion of climate on the "top of the world." Hydrometeorological station established in 1938 at the famous Lake Sarez, formed by a landslide in 1911. Annual precipitation at Lake Karakul (height 3990 m) is 27–30 mm. Diurnal temperature in the summer ranges from −2°C up to 25°C. *Subject Headings:* **1. Limnology 2. Climate of Pamir 3. Pamir, U.S.S.R.**—*A.A.*

12C–41 551.481.1

Clarke, David B. and Bryson, Reid A., **Investigation of the circulation over Second Point Bar, Lake Mendota.** *Wisconsin. Univ. Lake Investigations Committee, Report* No. 16, Feb. **1958.** 10 p. 6 figs., 2 refs. **DWB** (M(055) W811re)—The flow of water in the middle and surface layers around and over a lake bar (summer of 1954, Second Point Bar, Lake Mendota, Madison, Wisc.) was examined in terms of horizontal and vertifical velocities, and divergence. These quantities were mapped and the patterns correlated with the general current velocity, wind conditions and obstruction by the bar. The flow above the thermocline was only slightly affected by the bar whereas the water within the thermocline was subject to strong vertical motion. (*Same item as* 11.5–206, *Met. Abstracts.*) *Subject Headings:* **1. Lake currents 2. Lake Mendota, Wisc.**—*Authors' abstract.*

**12C–42** 551.481.1:551.482.213

Czepa, O., **Über die eigenfarbe der Binnenseen.** [The true color of inland lakes.] *Wetter und Leben*, Vienna, 4(9–10):146–152, Dec. **1952.** 2 figs., 2 tables, 13 refs., 2 eqs. **DWB**—The true water color is defined as the color of the solar light and the light of the sky reflected by the interior of the water body. The various theories involving degree of absorption of different wave lengths, chemical composition of the water and scattering of sunlight in suspension are reviewed critically. By means of the theory of GANS and VON LAUSCHER, which expresses the light from the entire water interior returning to the surface ($u$) is proportional to the quotient of the scattering coefficient $\beta\lambda$ and the extinction coefficient $s\lambda$ or $u \sim \beta\lambda / s\lambda$, and the *IBK*-color triangle, it is shown that it is possible to explain the manifold variations of the color of the water of inland lakes. *Subject Headings:* **1. Color of water 2. Lakes.**—*I.L.D.*

**12C–43** 551.481.1

Czepa, Otto, **Zur Optik der Hydrosphäre.** [On the optics of the hydrosphere.] *Forschungen und Fortschritte*, Berlin, 27(5):129–131, Nov. **1953.** 2 figs., 13 refs. **DLC**—The extinction of light is set out for pure water between 1200 and 500 m$\mu$ and for various lakes 750–400 m$\mu$. A theoretical discussion follows, relating scattering to wave length, azimuth and effect of suspended matter and of water movement. *Subject Headings:* **1. Light absorption 2. Lakes.**—*C.E.P.B.*

**12C–44** 551.481.1:535.34

Czepa, Otto, **Über die spektrale Lichtdurchlässigkeit von Binnengewässern.** [The transparency of inland waters to spectral light.] *Wetter und Leben*, Vienna, 6(5/6):122–128, Aug. **1954.** 2 figs., 2 tables, 12 refs., 2 eqs. German and English summaries p. 122. **DLC**—The light transparency of several Berlin and Brandenburg lakes was studied by means of a Pulfrich photometer. By combining the selective absorption of pure water with the selective absorption in the short wave region of the spectrum of dissolved organic substances there was obtained a good approximation of extinction in natural waters. *Subject Headings:* **1. Transparency of inland waters 2. Light absorption 3. Inland lakes 4. Germany.**—*I.L.D.*

**12C–45** 551.481.1(09) **551.526.8**(09)

†Czepa, Otto, **Die Entwicklung der physikalischen Limnologie.** [The development of physical limnology.] *Forschungen und Fortschritte*, Berlin, 28(9):269–276, Sept. **1954.** 61 refs. **DLC**—This well documented history begins with the fundamental work of F. A. FOREL between 1868 and 1912, especially on Leman (Lake of Geneva) but origins are traced much further back. The temperature discontinuity discovered in 1889 (E. RICHTER) and observations of seiches mainly since 1803 (P. L. VAUCHER) are described. Measurement of penetration of radiation into lakes goes back to FOREL and E. SARASIN in 1873. Early in the 20th century great activity began in many countries especially in the study of seiches, the radiation balance and the discontinuity layer. (*Same item as* 6.1–187, *Met. Abstracts.*) *Subject Headings:* **1. History of limnology 2. Lakes temperatures 3. Seiches.**—*C.E.P.B.*

**12C–46** 551.481.1

Czepa, Otto, **Strahlungsverhältnisse einiger Seen in Mecklenburg.** [Radiation conditions of several lakes in Mecklenburg.] *Acta Hydrophysica*, Berlin, 2(4):148–151, **1955.** 2 tables, 3 refs. **DLC**—Transmission coefficients and light intensity values at different depths up to 10 m are given for selected wave lengths from 367 to 734 m$\mu$, measured by means of photoelements and filters. *Subject Headings:* **1. Color of water 2. Lakes 3. Mecklenburg, Germany.**—*A.A.*

**12C–47** 551.526.8

Czepa, Otto and Schellenberger, G., **Über den Wärmehaushalt des Breiten Lucin- und Haussees bei Feldberg (Mecklbg.).** [Heat economy of the Breiter Lucin- and Haussee Lakes near Feldberg, Mecklenburg.] *Acta Hydrophysica*, Berlin, 3(4):161–180, **1956.** 4 figs., 6 tables, 12 refs., numerous eqs. **DLC**—Dates for thermal jump layer are given. The vertical temperature distribution helps in computing the changes in total heat capacity. Global radiation, albedo, long wave radiation and convection are considered for evaluating the evaporation. The results are in reasonable agreement with measured values on other lakes. A graph shows the dependency of the "austausch" coefficient on wind speed. (*Same item as* 9.1–219, *Met. Abstracts.*) *Subject Headings:* **1. Heat balance of lakes 2. Limnology 3. Mecklenburg, Germany.**—*A.A.*

**12C–48** 551.556.8:532.59:551.461.2

Czepa, Otto and Schellenberger, Günter (*both, Inst. Phys. Hydrographie, Akad. Wissenschaften, Berlin*), **Zur Charakteristik winderzeugter Oberflächenwellen von Binnenseen.** [Characteristics of wind-generated surface waves in lakes.] *Beiträge zur Geophysik*, Leipzig, 68(3):171-187, **1959.** 12 figs., 3 tables, 18 refs., 8 eqs. German and English summaries p. 171. **DWB, DLC**—Records of wind-generated waves taken at a lake with fetches varying up to 3 km have been analyzed. For every record, wave-period and wave-height parameters (for instance mean wave height, significant wave height) were calculated, and relationships between them and the wind speed were established. The results were compared with those of similar analyses for ocean waves. *Subject Headings:* **1. Wind effects on lakes 2. Wave analysis.**—*Authors' summary.*

**12C–49** 532.594:551.556.8

Darbyshire, J. and Darbyshire, Mollie, **Seiches in Lough Neagh.** *Royal Meteorological Society, Quarterly Journal*, 83(355):93–102, Jan. **1957.** 7 figs., 3 tables, 12 refs., eqs. **DWB**—Fluctuations of level at 4 places on Lough Neagh in April 1949 showed dominant periods of 1.6 and 1.15 hrs with nodal lines across the middle parallel to the shorter sides, and 0.75 hr which was smaller and may be a harmonic of 1.6 hrs or a transverse oscillation. Amplitudes of seiches agreed closely with wind speed × rate of change of wind direction. They were damped to half original amplitude in 10 hrs. *Subject Headings:* **1. Seiches 2. Wind effects on water surfaces.**—*C.E.P.B.*

**12C–50** 551.481.1:551.482.214

Datsko, V. G., **Vynos biogennykh veshchestv rekami i ego znachenie dlia produktivnosti vodoemov na primere nekotorykh morei SSSR.** [Discharge of biogenic matter by rivers and its importance for the productivity of reservoirs as exemplified by certain seas of the USSR.] *Vsesoiuznyĭ Gidrologicheskiĭ S''ezd, Oct. 1957, Trudy*, Vol. 10, issued **1959.** p. 178–182. 3 tables, 8 refs. **DWB**—In order to determine the amounts of biogenic elements in the zone of photosynthesis of a body of water, and the amount of such elements brought in, it is necessary to ascertain the turnover associated with the amount of primary production of organic matter which can provide a known quality of elements in any body of water. Turnover is expressed as the ratio of required amount of biogenic elements for obtaining a definite quantity of primary production of organic matter during a given period in the zone of photosynthesis ($A$) to its actual amount ($B$)—turnover is given by $A/B$. An examination of the inflow of phosphorous and nitrogen as phosphates, nitrates, etc. with river waters into the Sea of Azov shows that the annual amount flowing into the sea is small in comparison with the annual production of photosynthesis. An eight-fold turnover [$(A/B)=8$] of phosphorous is suggested in order to account for the annual production of photosynthesis. The temperature conditions of the waters of the Sea of Azov are such as to bring about a coefficient of turnover equal to 8. In the water of the Sea of Azov, nitrogen turnover should be about 7 in order to account for the annual production of phytoplankton. Data are presented on the approximate balance of phosphorous and nitrogen in the Sea of Azov and on the fluctuation of phytoplankton production in the Sea of Azov as related to the fluctuations of transport of biogenic elements by rivers. *Subject Headings:* **1. Biogenic elements 2. Phosphorus in reservoirs 3. Nitrogen in reservoirs 4. Sea of Azov.**—*I.L.D.*

**12C–51** **551.583.3**:551.312.2:581.16 **551.583.3**:539.16:546.26

Deevey, Edward S., Jr., **Bogs.** *Scientific American*, N. Y., 199(4):114–122, Oct. **1958.** 4 figs., 2 photos. **DLC**—Formation of true bogs (as opposed to marshes) of the Northern Hemisphere and their influence upon historic, present, and future climate is discussed here. Bogs in general, and particularly the raised bogs, are not only pre-sensitive of climate but they do record the historic climate which can easily be interpreted by cross sectioning a bog. Distinct layers reveal the climatic chronology by the pollen method (attributed to LENNART VON POST, 1916) which is exemplified graphically from 7600 B.C. up to 600 B.C. The radiocarbon dating supports POST's statement of a worsening of the European climate about 600 B.C. Peat bogs, rich in carbon dioxide, may well be responsible for increase of the atmospheric content since fossil fuel is but partly accountable. Not less than 336 billion tons of carbon dioxide, or 6 times the present atmospheric content, will be released if warm climate spurs its oxidization. Perhaps the climate already has become warmer because of the 11% "dephlogisicated air" dispersal. A doubling of the atmospheric carbon dioxide may melt the glaciers which will raise the sea level of about 100 ft. *Subject Headings:* **1. Peat bogs 2. Pollen analyses 3. Carbon dioxide in atmosphere.**—*W.N.*

**12C–52** 551.588.4

Defant, Albert, **Der Einfluss des Baikalsees auf das Klima seiner Umgebung.** [The influence of Lake Baikal on the climate of the surrounding lands.] *Geografiska Annaler*, Stockholm, 17:285-299, **1935.** 7 figs., tables, refs., eqs. **DLC**—A case study of the moderating effect of Lake Baikal on the severe continental climate of south central Siberia. Monthly vertical and horizontal temperature distributions over the lake and surrounding territory are tabulated. (*Same item* as 5A–134, Jan., 1954, *Met. Abstracts.*) *Subject Headings:* **1. Lake effects on climate. 2. Lake Baikal, Siberia.**—*M. P. Kramer.*

**12C–53** 551.481.1:532.594

Defant, F., **Theorie der Seiches des Michigansees und ihre Abwandlung durch Wirkung der Corioliskraft.** [Theory of the seiche of Lake Michigan and its deflection by the Coriolis force.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 6(2):218–241, Dec. **1953.** 7 figs., 7 tables, 17 refs., 38 eqs. German, English and French summaries p. 218–219. **DLC**—The longitudinal free surface oscillations of L. Michigan are calculated by 3 methods: single- and double-mode seiches (periods 9.08 and 4.92 hrs) are found. The earth's rotation introduces a forced transversal oscillation of about one-fifth the amplitude of the longitudinal oscillation. *Subject Headings:* **1. Seiches 2. Lake Michigan.**—*C.E.P.B.*

**12C–54** 551.481.1

De Marchi, G., **Caractéristiques hydrologiques et hydrauliques des grands lacs subalpins.** [Hydrological and hydraulic characteristics of the great sub-Alpine lakes.] *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Oslo, 1948, Transactions,* 1:327–331, [1950?] 9 tables, eqs. **DWB**—Discussion of the water level and discharge regime of five sub-Alpine lakes. Data for the water balance of their catchment areas are compared with the average height, percentage of glacier area and permeable geological formations. *Subject Headings:* **1. Lake levels 2. Limnology 3. Italian Alps.**—*A.A.*

**12C–55** 551.579.4:551.481.1(494.1)

De Marchi, Giulio, **Caratteristiche idrologiche e idrauliche dei grandi laghi subalpini.** [Hydrologic and hydraulic characteristics of large sub-Alpine lakes.] *Milan, Politecnico Istituto di Idraulica e Costruzioni Idrauliche, Memorie e Studi,* No. 84, **1950.** 7p. 9 tables, eqs.—Author tabulates characteristics of 5 sub-Alpine lakes; inflow, outflow, volume change and apparent loss. Smoothing of flow is given by $g = a + Bh$ where $g$, $a$ are outflow and inflow and $B$ is a constant depending on area of lake and rate of change of level. (*Same item as* 2.8–128, Aug. 1951, *Met Abstracts.*) *Subject Headings:* **1. Hydrology 2. Lakes.**—*C.E.P.B.*

**12C–56** 551.556.8:551.481.1 551.526.8

Diénert, M. F. and Guillerd, A., **Mouvement de l'eau dans les lacs.** [Water movement in lakes.] *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Oslo, 1948,* [*Transactions*], 1:379–385, [1950?] fig., tables, refs. **DWB**—Discusses currents in Lake of Geneva caused by winds and gives some temperature data. (*Same item as* 6.6–246, *Met. Abstracts.*) *Subject Headings:* **1. Lake currents 2. Lake temperatures 3. Lake of Geneva, Switzerland.**—*A.A.*

**12C–57** 551.579:551.509.1 551.481.1

Dimaksian, A. M., **Radiotelemetricheskaia avtomaticheski deĭstvuiushchaia ozernaia stantsiia "Rados."** [Radiotelemetering automatic drifting lake station "Rados."] *Vsesoiuznyĭ Gidrologicheskiĭ S"ezd, Trudy* (of 3rd Conference, Oct. 1957), Vol. 8, issued **1959.** p. 185–192. 2 figs. **DWB** (M79 V985tr)—After a short review of frequency and impulse telemetric methods, a detailed description of the automatic radiotelemetric station "Rados," is given. This drifting station includes thermometers for measuring temperature of water and air and psychrometers, anemometers and hair hygrometers. Data are radioed to distance of 50–100 km every three or six hours. It can work up to three months without recharging or control *Subject Headings:* **1. Radiotelemetric stations 2. Automatic drifting lake stations.**—*J.N.*

**12C–58** 551.481.1:525.63

†Dohr, G. (*Hannover*), **Statistischer Nachweis von Gezeiten in Binnenseen, dragestellt am Beispiel des Bodensees.** [Statistical proof of tides in lakes, taking Lake Constance as an example.] *Zeitschrift für Geophysik,* Würzburg, 23(5):256–272, **1957.** 8 figs., 29 refs. German and English summaries, p. **256. DLC** (QC801.Z4)—This paper examines the question, whether statistical methods are adequate for the proof of tidal waves on inland waters. Similarly as in procedures for demonstrating tides of the atmosphere here the registrations of recording water gages are submitted to harmonic analysis. The results are presented by use of harmonic dials. The statistical review of 274 days gives the proof of the $M_2$-wave showing an amplitude of 0.4 mm on the watergage at Konstanz. The material was submitted to a statistical error investigation, and it could be shown that the value of 0.4 mm amplitude ranges outside of random fluctuation, and that no quasi-persistance is evident. The discussed method seems to be suited for the proof of tidal waves on inland waters. *Subject Headings:* **1. Lake tides 2. Tidal waves 3. Lake Constance.**—*Author's abstract.*

**12C-59** 551.**573**.581.11:551.481.2

Dōkoshi, J. and Maeda, T. (*Fac. of Agric., Hokkaido Univ.*), **Studies on the evapo-transpiration, Pt. 1, On the phenomena observed in the drainage of peat bog.** *Journal of Agricultural Meteorology*, Tokyo, 15(1):21–24, June **1959.** 4 figs., table. In Japanese; English summary p. 24. **DWB**—Measuring the discharge of water from a peat bog, we obtained a discharge curve along with periodical daily changes in a drainage. In this experiment, it was found that evapotranspiration from the surface of peat bog was a major cause of periodical daily change. Evapotranspiration increased gradually with time after sunrise and decreased with time after sunset. The minimum discharge due to evapotranspiration occurred at 3∼4 p.m. The water level reached its maximum just after a rain, and then discharge decreased gradually and exponentially. The daily loss by evapotranspiration was superposed on the exponential function. Thus these are expressed by the following formula $Q = Ae^{-\lambda(t-3)} - Be^{-\lambda'(t-3)}\{1 - \sin(\pi/12)(t+3)\}$. Here $\lambda$ denotes the coefficient of decrease of discharge ($-0.0015 \sim -0.0016$), $\lambda'$ the coefficient of decrease of amplitude of evapotranspiration ($-0.0012 \sim -0.0013$). The quantity of evapotranspiration for 24 hrs was 15∼27% of the daily total discharge (Fig. 3[c]), and the maximum quantity at 3∼4 p.m. was 34∼70% of the total discharge at that time (Fig. 3[d]). *Subject Headings:* **1. Evapotranspiration 2. Peat bog drainage.** —*Authors' summary.*

**12C-60** 551.**586**:551.481.1(439.1)

Donászy, Ernö, **Bioklíma tanulmányok a Szelidi tavon.** [Bioclimatological studies on the Lake of Szelid.] *Hidrólogiai Közlöny*, Budapest, 38(5):389–396, Oct. **1958.** 2 figs., 3 tables, refs. Russian and German summaries p. 396.—Data on biologically significant meteorological elements (radiation, water transparency, atmospheric and water temperature, precipitation) and their frequency values are presented for the Lake of Szelid (1930–1955). Propagation characteristics of a large number of aquatic organisms are described and related to climatic factors. *Subject Headings:* **1. Lake bioclimatology 2. Szelid Lake, Hungary.**—*G.T.*

**12C-61** 551.481.1:551.520.8

*Donchenko, R. V., **Metodika rascheta teplopter' s vodnoĭ poverkhnosti v zimniĭ period.** [Method of calculating heat loss from a water surface during the winter.] *Leningrad. Gosudartvennyĭ Gidrologicheskiĭ Institut, Trudy*, No. 72:42–60, **1959.** fig., 16 tables, 5 refs., 10 eqs. Russian summary p. 60. **DWB**—Practical methods for calculating heat loss from a water surface in connection with the processes of cooling of water and ice formation on rivers and in water reservoirs. These are based upon the method of heat balance. The contents of this paper are as follows: the formulas for calculating the components of the heat balance equation, the amount of heat eliminated in a current or a result of the fraction of moving water, the amount of heat given off by the bottom layer of the water and expenditure of heat for melting of solid precipitation, and the wind velocity and the air temperature at the surface of the water on the basis of meteorological data obtained on land, the procedure for calculating the heat losses and the heat fluxes by means of these equations; and an example of calculations of heat production from water is presented. The results of calculations are presented and tables for calculating the various parameters of the equations are given. *Subject Headings:* **1. Heat loss from water surfaces 2. Heat balance equations.**—*I.L.D.*

**12C-62** 551.481.1:551.464:546.17

Dugdale, Richard; Dugdale, Vera (*both, Univ. of Pittsburgh*); Neess, John and Goering, John (*both, Univ. of Wisc., Madison*), **Nitrogen fixation in lakes.** *Science*, Wash., D. C., 130(3379): 859–860, Oct. 2, **1959.** fig., 6 refs. **DLC**—Incorporation of $N^{15}$ into the fixed nitrogen fraction of natural lake waters has been studied for the purpose of estimating rates of primary nitrogen fixation. Experiments in Pymatuning Reservoir, Pa., in Lake Mendota, Wisc., and in two lakes in Alaska indicate that fixation occurs at measurable, sometimes high, rates. *Subject Headings:* **1. Nitrogen fixation in lakes 2. Limnological studies 3. Lakes and reservoirs.**—*Authors' abstract.*

**12C-63** 551.**573**:551.481.1(72)

*Duryea, Edwin, Jr., Haehl, H. L. et al., **A study of the depth of annual evaporation from Lake Conchos, Mexico.** *American Society of Civil Engineers, Transactions*, 80:1829–2060, **1916.** 31 figs., 7 plates, 99 tables, refs., eqs. **DLC**—Paper treats of determination of yearly evaporation from a large reservoir, where an accurate value was needed, yet where there were no existing evaporation data for places nearer than 300 mi, and no local data except mean temperatures and elevation above sea level. Estimates then checked by actual observations. Pan evaporation measurements made, as well as temperature, effects of elevation, and determinations of inflow and outflow. (*Same item as* K-3, Oct., 1950, *Met. Abstracts.*) *Subject Headings:* **1. Evaporation from lake sand reservoir 2. Lake Conchos, Mexico.**

**12C–64** 551.526.8:551.482.2(282.244.3)

*Dussart, Bernard and Suchet, Marysette, **Influence du Rhone sur l'état thermique du Lac Léman.** [Effect of the Rhone River on thermal conditions in the Lake of Geneva.] *Académie des Sciences, Paris, Comptes Rendus,* 235(15):806–808, Oct. 13. **1952.** tables. **DWB**—Simultaneous measurements of water temperature at two extreme points of the Lake of Geneva at one-hour intervals for ten hours for every meter down to 40 m and every 10 m below that depth were made in May 1952. Data on the depth at which temperature values ranging from 6 to 16°C (at one-degree intervals) were obtained each hour are tabulated for both sites. The results appear to refute the opinion that the water of the Rhone flows down to the lake's bottom or rapidly mixes with the lake's water. It is found, on the contrary, that such mixing occurs in the lake's surface water only, and water supplied by the river stagnates at a depth of 15–25 m. A comparison of variation in river flow and in lake temperature confirms the correctness of this statement. (*Same item as* 4.6–138, *Met. Abstracts.*) *Subject Headings:* **1. Lake temperatures 2. River water temperature influences 3. Rhone River 4. Lake of Geneva.**—*G.T.*

**12C–65** 551.482

Dzens-Litovskiĭ, A. I., **Azonal'nye iavleniia v zonal'nosti prirodynkh vod SSSR.** [Azonal phenomena in the zonality of natural waters of the U.S.S.R.] *Vsesoiuznyĭ Gidrologicheskiĭ S''ezd, Oct. 1957, Trudy,* Vol. 10, issued **1959.** p. 23–33. fig., 43 refs. **DWB**—Azonal or anomalous phenomena are hydrochemical anomalies in the zonal extension of surface and underground waters. The hydrochemical phenomena of waters are considered only in relation to their ionic composition and temperature of the waters. A detailed analysis, based upon the available literature, is presented for the U.S.S.R. on the azonal hydrochemical phenomena in the geographical zonality of surface waters, in the hydrochemical geographical zonality of undergound waters, and in the hydrochemical vertical zonality of underground waters, as influenced by the geological structure and hydrogeological conditions, influx of surface and underground waters, nature of the supply of lakes and rivers in different parts of a lake basin or river channel. A diagramatic map of the azonality of natural waters of the U.S.S.R. is presented. *Subject Headings:* **1. Hydrochemical phenomena of inland water 2. Hydrochemical analysis 3. U.S.S.R.**—*I.L.D.*

**12C–66** 551.579:551.481.1

†*Eardley, A. J.; Gvosdetsky, Vasyl and Marsell, R. E., **Hydrology of Lake Bonneville and sediments and soils of its basin.** *Geological Society of America, N. Y., Bulletin,* 68(9):1141–1201, Sept. **1957.** 20 figs., 16 tables, 37 refs. **DLC**—This monographic article discusses the volume, salt content, salinity variations, annual accession of salt, precipitation-evaporation economy, lake level adjustment to precipitation, of temperature changes related to precipitation, the expansions of Lake Bonneville, shore-lines, sedimentary records, soils and their correlation and, finally, the chronology of various stages of Lake Bonneville. The classical and a proposed chronology are compared graphically. About 6 billion tons of salt now exist in the Basin, and there is an annual accretion of 1 million tons, yielding a date of 6000 yrs for the last overflow. The latter, however is estimated at >30,000 yrs ago (from $C^{14}$ analysis). Wind action is supposed to be the cause of the deficiency in salt at present. A rise of 20–30 ft would cause Salt Lake to overflow. Actual range of lake level has been nearly 19 ft in historical times, due to precipitation variations. (*Same item as* 9.9–270, *Met. Abstracts.*) *Subject Headings:* **1. Hydrology of Lake Bonneville 2. Salt content of lakes 3. Lake level variations 4. Lake, Bonneville, Utah.**—*M.R.*

**12C–67** 551.526.8:551.48

*Eckel, O., **Über die Veränderlichkeit und Reduzierbarkeit von Mittelverten der Fluss- und Seetemperatüren.** [On the variability and reducibility on mean values of river and lake temperatures.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B,* 3:172–188, **1951.** fig., 8 tables, 6 refs. German, English and French summaries p. 172–173. **DLC**—Gives for Feb., Aug., year-long period mean temperatures, variabilities and probable errors for numerous rivers in central Europe, also monthly means and variabilities of river and lake surface temperatures. The difference between corresponding means are used to discuss how far a series can be corrected to a different period; this is found to be generally practicable for rivers but less so for lakes owing to their abnormal annual variation. (*Same item as* 3.2–112, Feb. 1952, *Met. Abstracts.*) *Subject Headings:* **1. River temperatures 2. Lake temperatures 3. Central Europe.**—*C.E.P.B.*

**12C–68** 551.526.8:551.48(436)

*Eckel, O., **Über die interdiurne Veränderlichkeit der Fluss- und Seeover flächen-temperatüren.** [The interdiurnal variability of temperatures of river and lake surfaces., *Wetter und Leben,* Vienna 3(9/10):203–212, Nov. **1951.** 3 figs., 3 tables, 12 refs. **DWB**—The interdiurnal variability of the surface temperatures of 34 lakes and rivers in Austria on the basis of a ten-year daily record of 7–8 o'clock temperatures and a table giving the mean interdiurnal variability of the surface temperatures for each month are presented. The mean interdiurnal variability of the surface temperatures ranges between 0.2 and 0.7°C for individual years with considerable scattering. Lake surfaces show a marked summer maximum and winter minimum; the rivers show maximum values between spring and summer and minimum values in winter. The characteristics of the surface temperature are explained qualitatively by the heat exchange (global radiation) and water drainage regimes. Also, the variability of the noon and afternoon temperatures is examined, but their amplitudes are smaller than that of the morning temperatures. (*Same item as* 3.9–147, Sept. 1952, *Met. Abstracts.*) *Subject Headings:* **1. Lake temperatures 2. River temperatures 3. Interdiurnal temperature variations 4. Radiation effects 5. Austria.**—*I.L.D.*

**12C–69** 551.**526.8**:551.481.1(436)

*Eckel, O., **Mittel- und Extremtemperaturen des Hallstättersees.** [Mean and extreme temperatures in the Hallstätter Lake.] *Wetter und Leben*, Vienna, 4(5/7):87–93, July **1952.** fig., 2 tables, 5 refs. **DLC**—Mean and extreme temperature data are given for the period 1922–1950 arranged by decades from the surface to a depth of 100 m and mean monthly surface data for the period 1901–50. The results are compared with Lunzer Untersee. (*Same item as* 4.7–112, *Met. Abstracts.*) *Subject Headings:* **1. Lake temperatures 2. Hallstätter Lake, Austria.**—*A.A.*

**12C–70** 551.**526.8**:551.481.1(436)

Eckel, O., **Zur Thermik des Neusiedlersees.** [Thermal characteristics of Neusiedler Lake.] *Wetter und Leben*, Vienna, 5(3/4):72–78, May **1953.** 6 tables, 13 refs. **DLC**—Data for 1951 on temperature stratification consisting of mean monthly temperature difference between surface and bottom water at 7, 14 and 21 h, diurnal range of mean and extreme surface temperatures for every month and comparative data with other Alpine lakes are given. A discussion of ice formation on Neusiedler Lake is presented on basis of data for 1928–1950. (*Same item as* 5.2–152, Feb., 1954, *Met. Abstracts.*) *Subject Headings:* **1. Lake temperatures 2. Temperature stratification 3. Neusiedler Lake, Austria.**—*I.L.D.*

**12C–71** 551.481.1

Eckel, O., **Der Traunsee als Gegenstand naturwissenschaftlicher Forschung.** [Traun Lake as a subject of scientific investigation.] *Wetter und Leben*, Vienna, 7(1/2):35–37, **1955. DWB**—The history of research on the hydrographic and biological characteristics of the Traun Lake is reviewed. The surveying and depth probing began in 1948; subsequently studies were carried out on its coloration, chemical properties, temperature anomalies, currents and hydrography. *Subject Headings:* **1. Hydrography 2. Lake studies 3. Traun Lake, Austria.**—*I.L.D.*

**12C–72** 551.**526.8**:551.481.1:551.**588.4**

*Eckel, O., **Beitrag zum Studium des Wärmeumsatzes in Seen.** [Contribution to the study of the heat balance in lakes.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 9(1): 120–157, **1956.** 5 figs., 14 tables, 9 refs., eqs. German, English and French summaries p. 120–121. **DWB**—Records of temperature, vapor pressure and wind were made on the surface of Lake Traun and 8 m above the shore, in 1953–54, and the diurnal and annual variations of evaporation $V$ and heat exchange $L$ computed. "In 62% of all hours the heat flux as well as water vapor current were directed from the water surface upwards, in 31% humidity was transferred to the air and at the same time heat to the water, and only in 7% both currents were directed to the water." In the second part, putting $\Delta T$ = temperature difference water-air, and $\Delta e$ = vapor pressure difference, curves of $\Delta e$, $\frac{1}{2}\Delta T$ and sum of both are shown for clear, overcast or misty, and stormy weather and the annual variation of the daily means shown. The water receives heat from the air in March through July, and gives heat to the air in Aug.–Feb., especially in winter. The data are set out in numerous tables. (*Same item as* 7.5–168, *Met. Abstracts.*) *Subject Headings:* **1. Lake influences 2. Heat balance of lakes 3. Traun Lake, Austria.**—*C.E.P.B.*

**12C–73** 551.**526.8**:551.**511.33**:551.481.1

Eckel, O. (*Inst. of Met., Vienna*), **Die Bedeutung der Sprungschicht für den Wärmehaushalt der Alpenseen.** [Importance of the discontinuity layer for the heat balance of Alpine lakes.] *La Météorologie*, Paris, Ser. 4, No. 45/46:339–344, Jan./June **1957.** 5 figs. German, French and English summaries p. 339. **DWB**—From voluminous observation material, three types of lakes can be distinguished in the eastern Alps during the summer months, based on their thermal stratification. Lakes with a pronounced discontinuity layer accumulate in general more heat than those with a less developed or mixing discontinuity layer. Exceptions are pointed out. The vertical layers, and finally the heat proportion of the epilimnion in relation to the total heat content of the lake are discussed. (*Same item as* 9.4–160, *Met. Abstracts.*) *Subject Headings:* **1. Heat balance of lakes 2. Lake discontinuity layer 3. Eastern Alps.**—*Author's abstract.*

**12C-74** 551.526.8:551.556.8:551.481.1

Einarsson, E., **The effect of wind on subsurface water temperatures in Thunder Bay.** *Canada. Meteorological Div., Cir.* 2687, Tec. 221; *Local Forecast Study*, No. 29, Winnipeg District, July 27, **1955.** 4 p. 2 figs., 3 refs. **DWB**—A study was undertaken to determine if the water temperature at an intake 40 ft below the surface of Thunder Bay, Lake Superior, was close enough to the surface water temperature for use on synoptic charts and in weather forecasting. Daily readings taken at Chippewa Park during June 25–July 16, 1954 were compared with intake temperatures at the Bare Point pumping station some distance away. Large fluctuations were noted in the Bare Point water temperatures; a difference of 19°F occurred on one day between Bare Point and Chippewa Park surface water. Low temperatures were connected with westerly winds on the succeeding day, and high temperatures with prevailing easterlies which pile up warm surface water in the Bay. Only the higher temperatures are considered representative. (*Same item as* 8.3-194, *Met. Abstracts.*) *Subject Headings:* **1. Lake temperatures 2. Wind effects on subsurface water temperatures 3. Thunder Bay, Lake Superior, Canada.**—*M.R.*

**12C-75** 551.481.1

†Ertel, Hans, **Theorie der thermischen Sprungschicht in Seen.** [Theory of a thermal discontinuity layer in lakes.] *Acta Hydrophysica*, Berlin, 1(4):151–171, **1954.** 2 figs., 48 refs., 74 eqs. **DLC**—The surface layer of a lake is a cold source during the night with a resulting vertical convection in comparison with a heat source during the day. The diurnal average of these processes can be considered as an exchange phenomenon of cold and heat sources leading to a fourth order partial differential equation. Its integral gives valuable clues to the formation, transposition and deformation of the thermocline, corresponding to the observed conditions. The time function of the surface temperature of the water is important. The basic differential equation is: $[(\partial/It)-\eta(I^2/Iz^2)]\times[(I/It)-\mu(I^2/\partial z^2)]T=0$; $T$ = temperature; $\eta$ and $\mu$ are exchange coefficients which become equal only under negligible wind, originated turbulence. One of the main results is that the depth of the thermocline increases proportionally to the square root of the time (under certain specified conditions). *Subject Headings:* **1. Thermoclines 2. Limnology.**—*A.A.*

**12C-76** 551.482.214(282.247)

Fesehko, N. G., **Transformatsiia gidrokhimicheskogo rezhima reki pod vliianiem zaregulirovaniia stoka na primere Tsimlianskogo vodokhranilishcha.** [Transformation of the hydrochemical regime of a river under the influence of flow regulation as exemplified by the Tsimlyansk reservoir.] *Vsesoiuznyĭ Gidrologicheskiĭ S"ezd, Oct. 1957, Trudy*, Vol. 10, issued **1959.** p. 82–89. 2 tables. **DWB**—The author presents the results of a long term study of the profound transformation of the hydrochemistry of the Don River, along the section above Kalach to the mouth of the river, brought about the construction of the Tsimlyansk reservoir in its channel. The process of transformation in the initial stage of the construction of the reservoir with the inundation of the valley of the river designated for the reservoir, and the influence of the shape of the surface upon the hydrochemical profile of the Tsimlyansk reservoir, are described. Morphometrical characteristics, such as decrease in depth of the longitudinal section from the lower dam section upward along the current, divide the reservoir into four parts, differing hydrologically and hydrochemically. The ionic gaseous and biogenic regime and the hydrological characteristics are described and a detailed account is given of the variation of the hydrochemical regime in the waters of the Don River below the reservoir. *Subject Headings:* **1. Hydrochemical analysis 2. Don River, U.S.S.R.**—*I.L.D.*

**12C-77** 551.481.1:532.594

Fjeldstad, Jonas Ekman, **The determination of longitudinal seiches in lakes.** *Archiv for Mathematik og Naturvidenskab*, Oslo, 51(1/2):21–27, **1951.** tables, eqs. Price per v. Kr. 8.00. **DLC**—Mathematical solution of integral equations for free oscillations in a lake of narrow breadth. A table is given for Lake Geneva which, with the aid of a simple formula, permits the rapid computation of seiches wherein the values obtained are the same as those found by DOODSON, CAREY, and BALDWIN by a much more laborious process. *Subject Headings:* **1. Seiches 2. Hydrography 3. Lake of Geneva.**—*M.R.*

**12C-78** 551.526.8:551.481.1(741,742)

*Fobes, C. B., **Extremes of ice-clearing dates calculated from new data of Maine and New Hampshire lakes.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 1(2):138–148, **1949.** 2 figs., 10 tables, 6 refs. English, German and French summaries p. 138–139. **DWB**—Tabulates long records for 10 lakes. Difference $R$ between extremes for different periods represented by $\log\log R = k \log P$, where $P$ is period in years; $k$ for different lakes varies from 0.134 to 0.595. (*Same item as* 8-70, Aug., 1950, *Met. Abstracts.*) *Subject Headings:* **1. Lake temperatures 2. Maine 3. New Hampshire.**—*C.E.P.B.*

12C-79 551.573:551.481.1

*†Follansbee, Robert, **Evaporation from reservoir surfaces.** *American Society of Civil Engineers, Transactions*, 99:704–747, **1934.** 20 tables, 53 refs. **DLC**—Results of all available evaporation records of U. S. and foreign countries reduced to reservoir surface evaporation by means of special coefficients for each station. Results given in summarized form of 210 evaporation records, along with temperature, wind and humidity records when available. Effects of temperature, wind and relative humidity, compared. Variations in evaporation throughout U. S. discussed. (*Same item as* K 43, Oct. 1950, *Met. Abstracts.*) *Subject Heading:* **1. Evaporation from lakes and reservoirs.**

12C-80 551.579.4:551.481.1(45)

Frosini, Pietro, **Il lago Trasimeno e il suo antico emissario.** [Lake Trasimeno and its ancient effluent.] *Società Geofrafica Italiana, Rome, Bollettino*, Ser. 8, 11(1/3):6–15, Jan./March **1958.** 3 figs., 2 tables. English summary p. 15. **DWB, DLC**—In the past centuries Lake Trasimeno caused several floods on the lands around it, which were imputed especially to the efficiency of the artificial effluent (the so called Cava), built by FORTEBRACCIO DA MONTONE. In 1602 the situation was so serious that Pope Clement VIII was urged to take steps and repair the Cava. Of the works done and illustrated in the note, information was found in some mss. of the Vatican Archive, amongst which there is even a plan of the ancient Cava, so far unknown. Some data concerning the level of the lake have been added, from the time of the construction of the new effluent, which began to work at the end of the last century, till nowadays, together with those concerning the rains, measured in Perugia. *Subject Headings:* **1. Lake hydrology 2. Flood studies 3. Lake Trasimeno, Italy.**—*Author's summary.*

12C-81 551.333:551.457

†Gams, H. (*Innsbruck*), **Staumäandermoore.** [Blocked meander-swamps.] *Zeitschrift für Gletscherkunde und Glaxialgeologie*, Innsbruck, 4(1/2):87–98, **1958.** 8 figs. (incl. photos), 40 refs. **DWB, DLC**—Formulation of the alpine swamps characterized by a meander pattern is discussed. The main premise of the theory is that the intrusions of sea ice forced the water to find its way between the frozen fragments of the sand and the turf causing the blocked swamps. Since early times repetition may have completed the work. *Subject Headings:* **1. Ice effects on swamp formation 2. Swamp formation.**—*W.N.*

12C-82 551.579:551.481.1:532.594

*†Gasser, Oswald, **Die Wasserspiegelschwankungen des Bodensees und ihre meteorologischen Grundlagen.** [Variations in the level of Lake Constance and their meteorological causes.] *Germany. Deutscher Wetterdienst, Berichte*, 5(35), **1957.** 24 p. 17 figs., 5 tables, 47 refs. **DWB, DLC**—Describes the geographical position of Lake Constance and its inflow area, its effect on climate and water balance. This is followed by a discussion of the periodic movements of the water level, observations of seiches, daily period of seiches, special weather situations associated with maximum oscillations, water level observations and seiches, aperiodic oscillations of the water level and water level as an equilibrium condition; inflow into Lake Constance including precipitation and inflow, snow melt and inflow, the relationship between atmospheric temperature and snow melt, evaporation, effect of precipitation and snow melt upon water, the level of Lake Constance for 1951, water balance of Lake Constance for 1951, outflow and water level of 1951 as compared with those of other years, the weather situations associated with greatest rivers in water level, the Lake Constance as a natural water reservoir and forecasting of water level, meteorological basis for regulating the water level of Lake Constance, application of the concepts and knowledge to other water reservoirs, etc. Extensive data are presented. (*Same item as* 9.10–257, *Met. Abstracts.*) *Subject Headings:* **1. Lake level variations 2. Seiches 3. Lake Constance.**—*I.L.D.*

12C-83 551.481(05)

**Gewässer und Abwässer,** Vol. 1, No. 1, pub. **1953.** Latest issue seen Vol. 3, No. 14, **1956.** pub. Düsseldorf, August Bagel Verlag. Each issue about 100 p. Irregular. figs., photos, tables, refs. **DLC** (QH98.G45)—This is an outstanding publication in this field and contains high quality detailed limnological studies and/or discussions (all in German) ranging in length from short papers to monographic articles of 100 or more pages with excellent photos and other illustrative material, graphs, tables and charts, and a bibliography at the end of each article. Authors in Vol. 3, No. 14 include H. SCHMIDT-RIES, H. CASEMIR, A. GRATE, etc. Pertinent articles to be abstracted separately. *Subject Headings:* **1. Limnology periodicals.**—*M.R. & A.J.M.*

12C-84 551.326.8:551.322:539.4

Gold, L. W., **Field study on the load-bearing capacity of ice covers.** *National Research Council of Canada. Div. of Building Research, Internal Report*, No. 192, Nov. **1959.** 3 p. fig., 2 tables.—The problem of transportation on frozen lakes in Canada is discussed. Logging companies have cooperated in determining load capacity of ice by recording weights placed on ice and the reaction. In calculations, 2 m of white ice is equal to 1 in. of good blue ice. Theoretically the bearing capacity of ice is equal to the square of its thickness. It is also noted that a sudden decrease in air temperature can cause high thermal stresses to develop. *Subject Headings:* **1. Ice loads 2. Frozen lakes 3. Canada.**—*A.H.K.*

**12C–85** 551.481.2

Goncharova, V. I.; Zav'ialova, I.N.; Petrova, I A., et al., **Nekotorye voprosy gidrofiziki bolot.** [Certain problems of the hydrophysics of swamps.] *Leningrad. Gosudarstvenyĭ Gidrologicheskiĭ Institut, Trudy,* No. 60:43–76, **1957.** 7 figs., 13 tables, 14 refs., 12 eqs. **DWB**—The results of a study on the runoff and evaporation from swamps carried out by the State Institute of Hydrology, during the period 1953–1955, are presented. This extensive study consists of three parts: (1) the capillary properties of peat deposits of a drained swamp in the Estonian S.S.R. (the Endla Swamp); (2) the role of the thermal characteristics of the upper layers of drained peat deposits in the formation of radiation frosts; (3) the presentation and verification of a more simple method of heat balance for measuring evaporation from swamps; and (4) precalculation of the depth of freezing of swamps and the physical properties of frozen swamp layers (porosity, permeability, etc.). The peat deposit of the drained lowland massif investigated possessed good capillary properties; even in slightly disintegrated peat there was a sufficient number of capillaries capable of raising water 1 m or higher. The size distribution of pores in peat deposits of drained lowland swamps is not uniform. With lowering of the ground water level, the capillary water capacity of the structure diminishes. Filtration in the upper peat layers occurs through the larger pores with a radius $>0.01$ cm. In fields with summer crops the capillaries show a break between the plowed horizon and the horizon below it. In fields with perennial grass the water supplies in the root zone are supplemented in drought years by capillary ascent. Owing to the small heat capacity and poor heat conductivity of peat deposits the frequency and intensity of frosts is greater on drained swamps than on undrained swamps and mineralized soils. The greatest duration of frosts on drained swamps occurs when the coefficients of exchange are small and when moisture content of the peat deposit is low. The verification of the simplified method of computing evaporation by means of the heat balance equation (V. V. ROMANOV, **Raschet ispareniia po uproshchennoma metodu teplovogo balansa.** [Calculation of evaporation by a simplified heat-balance method.] *Leningrad. Gosudarstvennyĭ Gidrologicheskiĭ Institut, Trudy,* No. 54(108):75, 1956.) showed that random errors are extremely large for short periods (hour, day). Random errors diminish rapidly for longer periods. The largest errors are obtained during the calculation of radiation balance; the least in computing the coefficient $\alpha$ = coefficient of proportionality between evaporation and radiation balance. The heat flow from melted depths of peat deposits is extremely small (in there is no sufficiently strong current of filtration water), and the term $b\tau$ in A. P. DOMANITSKIĬ'S equation for calculating the thickness of a frozen layer ($H = \sqrt{8\Sigma T + (4b)^2} - 4h - b\tau$) is not a heat advection magnitude but is only a correction compensating for errors of higher moisture values and heat conductivity which is invariable with depth of the deposit during freezing and in the entire thickness of the past deposit. These calculations correspond to observed values. They indicate that the role of wind, not considered in the formula, is secondary and that the basis of the method—the dependence of heat conductivity of the peat deposit upon its humidity at the moment of freezing, and the dependence of humidity upon the height of the layer above the ground water level, as a function of osmotic and capillary moisture capacity—is quite correct. The relevant formulas for calculating capillary capacity and evaporation and numerical data, in tables and graphs, are presented. *Subject Headings:* **1. Swamp hydrology 2. Peat deposits. I. Romanov, V. V. II. Ryvkina, V. B.**—*I.L.D.*

**12C–86** 551.553.11(6)

Green, F. H. W., **On- and off-shore winds in East Africa.** *Meteorological Magazine,* London, 70(831):57–60, April **1935.** 2 figs. **DWB**—New diagrams of air movements are used to show how well-marked the on- and off-shore breeze can be on the south shore of Lake Victoria. Diagrams are given for various hours of the day. (*Same item as* 2G–184, July, 1951, *Met. Abstracts.*) *Subject Headings:* **1. Special winds 2. Lake breezes 3. Lake Victoria, Africa.**

**12C–87** 551.573:551.481.1

Grunsky, C. E., **Evaporation from lakes and reservoirs.** *Monthly Weather Review,* 60:2–6, **1932.** 2 figs., table, 3 refs., equations. **DLC**—Author suggests a type of land pan to give results for a month which will indicate the relative amount of evaporation loss from widely separated large open water surfaces. Some conclusions given on relation of mean monthly temperature to mean monthly evaporation rate, including effect of air movement and altitude on this rate. (*Same item as* K–33, Oct., 1950, *Met. Abstracts.*) *Subject Heading:* **1. Evaporation from lakes and reservoirs.**

**12C–88** 551.326.85:551.481.1

Hansen, Kaj, **Ispresning i Tystrup Sø og Esrum sø vintern 1946 47.** [Ice pressure in Tystrup Lake and Esrum Lake during the winter 1946/47.] *Geografisk Tidsskrift*, Copenhagen, 49:67–72, **1948 1949.** English summary p. 72. **DWB**—After a brief summary of some of the literature dealing with the effects of ice pressure in the expansion of freezing ice, the author describes this phenomenon as seen in two Danish lakes—Tystrup Lake and Esrum Lake. Photographs show the action of ice pressure in folding the turf along the shore of the lake into a low vertical ridge and other effects. *Subject Headings:* **1. Ice pressure effects on ice expansion 2. Tystrup Lake, Denmark 3. Esrum Lake, Denmark.**—*I.L.D.*

**12C–89** 551.**577.21**:551.**579.4**:551.481.1(766)

*Harbeck, G. Earl, Jr. and Coffay, Ethel W. (*both, U. S. Geological Surv., Dept. Int., Denver*), **A comparison of rainfall data obtained from rain-gage measurements and changes in lake levels.** *American Meteorological Society, Bulletin*, 40(7):348–351, July 1959. 3 figs., table, 6 refs., eq. **DWB, DLC**—During the Lake Hefner evaporation studies of 1950–1951, changes in lake stage were measured with great accuracy. Rainfall records were obtained using a network of 22 standard 8-in. rain gages. In the present study, the lake was considered to be an immense rain gage, and the changes in lake stage were used as a measure of the rainfall. A comparison was then made with the average catch of the 22 rain gages around and on the lake. This catch was 10% less than the rise in stage on the lake. The data indicate that strong winds reduce the catch in the rain gages. (*Same item as* 11.5–308, *Met Abstracts.*) *Subject Headings:* **1. Lake level variations 2. Rain gage net works 3. Rainfall amount 4. Rain gage errors 5. Hefner, Okla.**—*Authors' abstract.*

**12C–90** 551.**556.8**:551.481.1:532.594(7:285)

Harris, D. Lee (*U. S. W. B., Wash., D. C.*), **Wind tide and seiches in the Great Lakes.** *Coastal Engineering Conference, 4th, Chicago, Oct. 1953, Proceedings*, p. 25–51. 14 figs., refs., eqs. **DWB**—The theory of forced oscillations of a lake is developed and applied to actual data for the Great Lakes for 1950 and synoptic charts for the days with important disturbances analyzed. Both general and local disturbances are considered. (*Same item as* 6C–72, *Met. Abstracts.*) *Subject Headings:* **1. Seiches 2. Lake level variations 3. Great Lakes.**—*M.R.*

**12C–91** 551.**556.8**:532.59:551.481.1

Haurwitz, Bernhard, **The slope of lake surfaces under variable wind stresses.** *U. S. Beach Erosion Board, Technical Memorandum*, No. 25, Nov. **1951.** 22p. 7 figs., eqs. **DWB**—The inclination of a lake surface, caused by a wind stress, shows a distinct time lag in adjusting itself to changing winds. To analyze this phenomenon use is made of the hydrodynamic equations which are simplified by integrating over the whole depth of the lake. It is found that the time required by the lake to respond to changing wind stresses depends on the length of the seiche periods. This dependence of the rapidity with which the lake level adjusts itself to the variable wind can be expected a priori. Particular attention is given to the case of a wind which changes its direction. Such a wind shift took place during the passage of the hurricane of 26–27 Aug., 1949, over Lake Okeechobee, Florida, when the wind turned through about 180° during a time of roughly three hours. This turning of the wind was accompanied by a turning of the height contours of the lake surface, but the latter rotated more slowly than the wind direction so that for some time the wind blew parallel rather than perpendicular to the isohypses. It is shown that the theory explains this behavior of the lake surface. (*Same item as* 5.11–131, Nov., 1954, *Met. Abstracts.*) *Subject Headings:* **1. Lake surface slope 2. Wind stress 3. Lake Okeechobee, Fla.**—*Author's abstract.*

**12C–92** 551.**579.3**:551.324.52(826)

Heinsheimer, Georg, J., **Zur Hydrologie und Glaziologie des Lago Argentino und Ventisquero Moreno, Argentinien.** [Hydrology and glaciology of Lake Argentino and the Moreno Glacier, Argentina.] *Zeitschrift für Gletscherkunde und Glazialgeologie*, 3(1):24–32, Dec. **1954.** 2 charts, 8 photos, table, 13 refs. Also his: **Der Durchbruch des Moreno Gletschers, Lago Argentino, Patagonien, 1953.** [The breakthrough of the Moreno Glacier, Lake Argentino, Patagonia, 1953.] p. 33–38. chart, 11 photos, 6 refs. German, English, and Spanish summaries p. 24, 33. **Pt. 2** [of first article] *Ibid.*, 3(3):327–333, **1956.** 4 refs. German, English and Spanish summaries p. 327–328. **Pt. 3,** *Ibid.*, 4(1/2):61–72, **1958.** 12 photos, 9 refs. English and French summaries p. 61–62. **DWB, DLC**—Pt. 1. In summer 1952–53 the Moreno Glacier dammed part of Lake Argentino, raising the water level. This advance, while the Patagonian ice which supplies the narrow glacier is still receding, is attributed to ice-falls.—The glacier had increased in thickness by 40 m since 1900 and penetrated a forest several decades old. On March 30 and 31, 1953, the waters of Lake Argentino broke through the ice dam. (*Same item as* 6.9–61, *Met. Abstracts.*) Pt. 2. In Aug. 1954, 17 months after the breakdown of the ice dam on March 30, 1953, the Moreno Glacier again blocked the Canal de los Tempanos. The glacier had increased considerably in depth and might outlast summer of 1954–55, causing a greater accumulation of water in the lake than previously known. If the ice-dam broke, this would cause a dangerous flood on Lake Argentino and the Rio Santa Cruz. (*Same item as* 8.6–314, *Met. Abstracts.*) Pt. 3. The Moreno Glacier again closed up the Canal de los Tempanos in Aug. 1954. The inundation of the southern part of Lake Argentino which followed was ended by the outbreak of the dammed-up waters during Oct. 9–10, 1956, after a partial outbreak some three weeks earlier. Hence, the inundation lasted for 26 mos., while all known preceding floods ended after a shorter period, in the worst cases at the end of the summer after they began. The level of the closed-up portion rose 23.36 m above the surface of the lake height attained after the outbreak. A small deviation to the south of the Moreno Glacier was observed and is due to the increase of its tributary glaciers of its northern side, whose ice masses have pushed aside the southern third of the glacier tongue to flowing into the dammed-up part of the lake. After the outflow of the inundation a very big drift of the accumulated sediments by the predominant western winds was visible. (*Same item as* 10.10–82, *Met. Abstracts.*) *Subject Headings:* **1. Glacial advance 2. Glacial floods 3. Lake Argentino, Argentina 4. Moreno Glacier, Patagonia.**—*C.E.P.B. and author's abstracts.*

**12C–93** 551.556.8:551.481.1

*Hellström, B., **Wind effect on lakes and rivers.** *Ingeniörsvetenskapsakademiens, Stockholm, Handlingar*, No. 158, **1941.** 191 p. 94 figs., 17 tables, refs., 174 eqs. **DN-HO**—A doctoral dissertation covering the effects of barometric pressure, wind effect with viscous and turbulent motion, wind effect on lakes and shape of water surface, wind effect in stratified fluids, laboratory experiments, wind force, the Lake Okeechobee Project, wind effect on rivers and canals and civil engineering with regard to wind effect. (*Same item as* 6C–32, *Met. Abstracts.*) *Subject Headings:* **1. Wind effects on water level 2. Lakes 3. Rivers.**—*M. P. Kramer.*

**12C–94** 551.556.8:532.593:551.481.1

Hicks, B. L. and Huber, E. A. (*both, Control Systems Lab., Univ. of Illinois, Urbana*), **Growth of small water waves with wind speed and fetch.** *Physics of Fluids*, N. Y., 1(5):454–455, Sept./Oct. **1958.** 3 refs., 2 eqs. **DWB**—Little is known quantitatively of the characteristics of small wind waves. The paper is a report of an actual measurement of the mean square surface displacement of the water in a small lake for many combinations of wave frequency, mean wind speed and mean fetch. Graphical analysis of the data show that the energy spectrum, for a given fetch and wind speed, is flat on the low frequency side and falls off about as f-5 on the high frequency side. Equation (1) is developed to represent this situation. The flatness of the spectrum on the low frequency side is possibly caused by the limited size of the lake and the octave width of the frequency bands. However, a detailed analysis of this and further experimental data is being awaited to assume more precise measurements. The experiment should yield new information concerning the dynamical processes that form wind waves. *Subject Headings:* **1. Wind effects on water surfaces 2. Wind wave formation.**—*I.S.*

**12C–95** 551.481.1(798)

†Hobbie, John E., **Limnological studies on Lakes Peters and Schrader, Alaska.** Dartmouth College, Hanover, N. H., Contract AF (19(604)-2159, Scientific Report No. 5, March 1, **1960.** 47 p. 11 figs., 12 tables, 33 refs. **DWB**—Limnological studies of two Alaskan Arctic lakes are presented. The lakes, Peters, and Schrader, are located on the north slope of the Brooks Range. The studies were made in July and Aug., 1958, under an Air Force Cambridge Research Center contract. Results are as follows: 1) High mountains surround Lake Peters whereas Lake Schrader is enclosed by lower hills. Winds are greater in the Peters valley than in Schrader because of the channeling effect of the narrow valley. 2) Most of the drainage basin of the lakes is composed of metamorphic rocks, quite resistant to leaching. Glaciers formerly occupied the lake valley, and at the present time several small glaciers drain into the lakes, adding large amounts of turbid water. 3) The climate of the region is characterized by long, cold winters and short, cool summers. The average temperature is close to −10°C and the average precipitation around 30 cm. 4) Both lakes are similar in bottom form with steep sides and a gradually sloping bottom. Lake Schrader is larger and deeper than Peters (13.2 km$^2$ and 57 m versus 6.9 km$^2$ and 50 m). 5) The run-off was constant from the end of June until the end of July when a decline started. Carnivore Creek (entering the south end of Peters) contributes over half of the water discharged into the lakes. 6) The extinction coefficients of both lakes changed over the summer as the amounts of glacial rock flour and silt in suspension fluctuated. The highest coefficients followed the peak of water inflow into the lakes. 7) Lake Schrader developed a stable thermocline while the thermocline of Lake Peters was temporary and easily destroyed by the wind. Heat was brought into the lower depths of Peters by a turbidity current of warm water flowing close to the 10-meter depth. This was found only in June and early July. By the end of Aug. Lake Peters had warmed to between 8 and 9.5°C and Lake Schrader to between 5 and 10.5°C. Total annual heat budgets of about 30,000 cal/cm$^2$ were estimated for both lakes which is in the same range as temperature lakes. 8) Chemical examination of the water showed

that the dissolved solids content of the lakes was low (33 ppm). The water may be classified as bicarbonate water with a pH less than 7.0. 9) The waters were between 95 and 99% saturated with oxygen. This is another indication of low productivity. 10) Very minor amounts of net algae found, but filters indicated that around 0.7 mg/m³ of Chlorophyll *a* was present in Lake Schrader. This amount could have produced on the average 1.05 mg carbon/m³/day in the euphotic zone at the radiation observed. This amount is similar to the productivity of the least fertile parts of the open ocean. *Subject Headings:* **1. Limnological studies 2. Lake Peters, Alaska 3. Lake Schrader, Alaska. I. Dartmouth College, Hanover, N. H. II. Contract AF 19(604)-2159.**—*Author's abstract.*

**12C–96** 551.481.1:551.579(494)

†*Hofer, Fritz, **Über die Energieverhältnisse des Brienzersees.** [Energy conditions of Lake Brienz.] *Beiträge zur Geologie der Schweiz, Geotechnische Serie, Hydrologie,* No. 7, **1952.** 95 p. 4 figs., 8 diagrs. (1 fold.), 18+ tables, 3 photos., bibliog. p. 93–95. English summary p. 91–92. **DWB**—One of the most comprehensive monographs on a single lake. In the hydrological part precipitation, evaporation, water level variations, in- and outflow and a single flood in 1948 are thoroughly treated. Estimated annual evaporation is 800 mm. Vertical and horizontal heat distribution and daily and annual temperature variations are analyzed computing heat content, stability and heat balance. Wind effects on currents and optical characteristics of the lake were also studied. Elaborate graphs and illustrative tables are distributed profusely throughout the text. (*Same item as* 4.11–10, *Met. Abstracts.*) *Subject Headings:* **1. Limnology 2. Hydrologic cycle 3. Heat balance of lakes 4. Lake Brienz, Switzerland.**—*A.A.*

**12C–97** 551.526.8:551.481.1(436)

Hofstetter, G., **Die interdiurne Veränderlichkeit von Seeoberflächen- und Seeabflusstemperaturen.** [The interdiurnal variability of lake surface and outflow temperatures.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B,* 4(3):281–293, **1953.** fig., 4 tables, 14 refs. German, English, French summaries p. 281–282. **DLC**—Mean change of surface temperature, 7 h–7 h of 6 Austrian lakes is tabulated by months; annual mean 0.3–0.5°C, minimum Dec.–Jan, maximum June–July. Annual variation of outflow temperature is smaller. Different lakes show the phenomena differently; mainly because of different thermal stratifications; in the outflow water these are smoothed by mixing. In 3 lakes diurnal variation of interdiurnal variability is studied; it is much greater 14 h–14 h than 7 h–7 h. Frequency distributions of 7 h–7 h changes are tabulated; range in winter +3.0 to −3.2, summer +3.6 to −5.5°C; causes of extreme values are discussed. (*Same item as* 4.8–136, *Met. Abstracts.*) *Subject Headings:* **1. Lake temperatures 2. Austria.**—*C.E.P.B.*

**12C–98** 551.526.8:551.481.1(436)

*Hofstetter, G., **Der Einfluss meteorologischer Faktoren auf die Temperatur alpiner Seen.** [The influence of meteorological factors on the temperature of Alpine lakes.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B,* 5(2):146–181, **1954.** 7 figs., 12 tables, 17 refs. German, English and French summaries p. 146–148. **DLC**—This close analysis of the factors affecting surface temperature of lakes is based on correlations of interdiurnal changes (7h–7h, 1939–43) of 10 lakes in sunny and cloudy weather with air temperature, sunshine, cloud, rainfall and wind. Considerable warming (up to 2–3°C/day) is caused mainly by solar radiation in March-Sept.; fine weather in Oct.–Feb. usually brings slight cooling. Cloudy days generally bring cooling in summer. Heat transfer air-water is much more effective than water-air, cooling by relatively cold air exceeding warming by warm air, but monthly water and air temperatures give $r = +0.06$ to 0.8. Strong cold winds, especially thundersqualls, cause marked cooling. Heavy rain in summer causes cooling through mixing of surface water with cold from streams and rivers. (*Same item as* 5.7–108, July, 1954, *Met. Abstracts.*) *Subject Headings:* **1. Lake temperatures 2. Austria.**—*C.E.P.B.*

**12C–99** 551.481.1 551.583.3:551(285:71:73)

*†Hough, Jack Luin, **Geology of the Great Lakes.** Urbana, Univ. of Illinois Press, **1958.** 313 p. 75 figs., 22 tables, bibliog. p. 297–310. **DLC** (QE78.H65). Review by S. E. Hollingworth in *Nature,* London, 184(4687):665, Aug. 29, **1959.**—This study of the geology of the Great Lakes is presented for the non-geologist and the geologist. The first part, in semi-popular style, contains material which forms a frame of reference for the history of the lakes; includes descriptions of the present lakes, the physical and chemical processes operating in them; summaries of the events in the region which led to formation of ancestral lakes; and a review of the methods used to date the events of lake history. Pt. 2, the geological history of lake stages, contains some original material, includes a detailed review and re-evaluation of the extensive literature on the Great Lakes. The geologic history is summarized in a correlation chart with radio-carbon dated time scale; a series of lake stage maps are appended. Contains brief reference to climatic influences on lake water. *Subject Headings:* **1. Limnology 2. Pleistocene geology 3. Hydrology 4. Great Lakes.**—*E.Z.S.*

**12C–100** 546.17:551.481.1

Hulburt, Edward M., **Distribution of phosphorus in Great Pond, Massachusetts.** *Journal of Marine Research*, New Haven, Conn., 15(3):181–192, **1956.** 7 figs., 2 tables, 8 refs. **DWB, DLC**—Inorganic phosphate and total phosphorus were determined during 1950 in Great Pond, Mass. Except in deeper water during summer, the concentration of inorganic phosphate was less in Great Pond than in its sources of fresh and salt waters. In summer the total phosphorus concentration was greater in the Pond than in the Sound or River, this being particularly so in deep water of the Pond. During the remainder of the year concentrations were about the same in Sound, Pond, and River. Up to 92% of the total phosphorus within the Pond was organic phosphorus. The summer accumulation of phosphorus is explained as being the result of increased photosynthesis, the products of which settle from the surface to the deeper waters which return them up-pond in the counter current. *Subject Headings:* **1. Phosphorus distribution 2. Phosphorus concentrations 3. Great Pond, Mass.**—*Author's abstract.*

**12C–101** 551.481.1

†Hutchinson, George Evelyn, **Lecture notes on limnology.** Distributed by request from the Osborn Zoological Laboratory, Yale Univ. New Haven, G. Evelyn Hutchinson, **1941.** Each lecture repaged. Refs. throughout. Some illustrative material tipped in. Reproduction of typescript. **DLC** (QH98.H8)—Lecture notes which might be profitably used as a textbook in an advanced course on limnology. The origin and morphometry of lakes are given preliminary consideration. Physical and chemical conditions in lakes are treated in detail with equal emphasis on theory and application. Subjects included are: optical properties; thermal properties; mechanism of hypolimnetic heating; denivellations and currents; dissolved gases (oxygen); carbon dioxide, bicarbonates and hydrogen ion concentration; alkali and alkaline earth cations (chloride and sulphate) iron, the oxidation-reduction potential; manganese; phosphorous, silicate and copper; the nitrogen cycle and dissolved organic matter. Biological relationships and activities are treated with separate sections on: phytoplankton; photosynthesis in lakes and the depth of distribution of aquatic plants zooplankton; cyclomorphosis and other form changes in planktonic organisms; bacteria of lakes and surface phenomena. A discussion on the air-water interface as a special ecological region that may develop striking associations of organisms precedes a discussion on various forms such as benthic fauna and the dynamics of the lake biota in general. The remaining parts of this volume treat the classification and succession of lakes; lakes in diverse climatic regions and their significance in typology. The biology of preglacial lakes is described and the last chapter consists of notes on ecology of river systems. Each chapter has a separate list of references. *Subject Headings:* **1. Limnology 2. Advanced limnology.**—*E.Z.S.*

**12C–102** 551.481.1(02

†*Hutchinson, George Evelyn (*Dept. of Zoology, Yale Univ.*), **Treatise on limnology, Vol. 1 Geography, physics, and chemistry.** New York, John Wiley; London, Chapman & Hall, **1957** 1015 p. 228 figs., 132 tables, bibliog. and index of authors, p. 913–978. List of symbols, p. 903–912 **DLC** (QH98.H82)—This is one of the most refreshing books to come out during the past few years It is the first of two volumes on limnology—the second will treat the biology, ecology, and stratigraphy of lakes. The chapters which are of most interest are: 1) origin of lakes; 2) morphology 3) the properties of water; 4) the hydrologic cycle and water balance of lakes; 5) hydromechanics o lakes; 6) optical properties; 7) thermal properties; 8) inorganic ions of rain, lakes and rivers 9) oxygen in lake water; 10) $CO_2$ and pH concentration; and 16) nitrogen cycle. A very extensive bibliography, list of lakes, and subject index are appended. Of special interest to meteorologist are the sections in Ch. I on glacial and wind formation of lakes; Ch. IV on precip.—lake level relations; Ch. V on currents, waves and seiches; Ch. VI on solar radiation, reflection, absorption, transmission, illumination, extinction, scattering, polarization, color mirages, solar or lunar paths, cosmic radiation, etc.; Ch. VII on heating, stratification, winter heating, ice effects, turbulence, eddy conductivity, heat budgets of lakes of the world, wind work, stability, energy exchange. evaporation effects on surrounding climate, lake ice, and in Ch. VIII on the chemistry of rain water. Most o these sections are quite extensive, covering every aspect of the subject treated in the literature up to 1954 (over 1600 references are cited), and presenting voluminous graph, tabular and cartographic data. (*Same item as* 9.9–6 and 11A–53, *Met. Abstracts.*) *Subject Headings:* **1. Limnology textbook 2. Limnology bibliographies 3. Optics of lakes.**—*M.R.*

**12C–103** 551.481.1:061.

International Association of Theoretical and Applied Limnology, **Verhandelungen. Proceedings. Travaux,** Vol. 1, pub. **1922.** Latest issue seen, Vol. 12, (Aug. 1953 meeting), pub. **1955** Issued Stuttgart, E. Schweizerbart. Title page in German, English and French. Text in German English or French. **DLC** (QH98.I5)—These vols. consist of the Proceedings of periodic meeting of the Limnological Association including the reports of the secretary and treasurer, welcomin addresses, outline of activities conducted by the Congress, and papers read at, or sent to, the meeting. World-wide membership in the Association totaled 676 at the time of the 12th Congress. (More detailed breakdown for 10 countries on p. 4, Vol. 12.) A photograph of 234 of the members and guests attending the Congress is given following the table of contents (in Vol. 12). Papers are of varying length (averaging 3–6 p.) and include a great deal of graphed, charted and/or tabulated data as well as maps, photos, figures and refs. (given at end of each paper). Papers are indexed both alphabetically and by subject. A wide range of limnological subjects by such authors as G. E. Hutchinson, G. Nygaard, P. Bourrelly, G. E. Fogg, J. Rźoska, E. W. Taylor, and many others is covered in over 100 papers contained in Vol. 12. Papers in earlier vols. are in German or French; later vols. include English as well. An excellent source for limnological material. *Subject Heading:* **1. Limnology conferences.**—*A.J.M.*

**12C–104** 551.57:061.3 551.324:061.3 551.48/9:061.3

International Union of Geodesy and Geophysics. Association of Scientific Hydrology, **Assemblée Générale d'Oslo, 19–28 août 1948.** [General Meeting in Oslo, Aug. 19–28, 1948] [1950?]. **V. 1. Travaux des Commissions de Potamologie et de Limnologie.** [Transactions of the Commissions for Potamology and Limnology.] 399 p. **V. 2. Travaux de la Commission de la Neige et des Glaciers.** [Transactions of the Commission for Snow and Glaciers.] 407 p. **V. 3, Travaux de la Commission des Eaux Souterraines.** [Transactions of the Commission for Ground Water.] 308 p. figs., tables, refs., eqs. **DWB**—A comprehensive symposium on the state of hydrological studies all over the world, presenting 140 papers, a considerable part of which contain important information, new aspects and theories. Contents of the first volume: Presidential address by Slettenmark on the hydrology of Sweden (maps) and a paper on hydrological conditions in Norway. Thirteen papers deal with evaporation and transpiration from soil lysimeters, water surfaces and catchment areas, the hydrologic cycle, and the time lag of runoff; and present a large amount of data. Seventeen papers are presented on the forecasting of floods, potamology in general, storage effects, runoff variations, hydrometric measurements, electrical flood wave analysis and storm water runoff. The third group of papers contains 5 items on river loads. The second part, devoted to limnology, contains 3 papers on the water balance of lakes, 6 items on lake level variations and 8 items on lake currents caused by wind and by flowing water, including one paper on the prevention of freezing. Contents of the second volume: Presidential address by Church, 2 papers on the distribution of ice and its interaction with weather processes, 22 important papers on snow and ice research, floods resulting from snow melting, physical changes in snow cover, effect of föhn winds, snow surveys and snow classification, altitude dependence of snow cover, etc., 3 papers on glacier ice crystals, 8 papers on glacier measurements, ablation and glacier variations and 12 papers on special glaciological research, climate and glaciers, runoff from glaciers, melting point of ice, etc. Six papers deal with supercooling and ice formation in lakes and rivers, prevention of freezing and general cryological problems. Contents of the third volume: Six papers on infiltration, percolation and evaporation from bare soil and their measurement by lysimeters, 6 papers on variations of ground water levels and artesian pressure and their dependence on rainfall and air pressure, 14 papers on thermal sources and their chemical composition, 4 papers on regional ground water studies and, finally, 5 papers on soil profiles, soil humidity and ground water balance. Abstracts of papers, important for meteorologists will be published separately. (*Same item as* 5.10-4, Oct. 1954, *Met. Abstracts.*) *Subject Headings:* **1. Hydrology symposia 2. Lakes and rivers 3. Snow and ice research 4. Glaciology 5. Ground water research. I. Slettenmark, Gustaf II. Church, J. E.**—*A.A.*

**12C–105** 551.5:581.526.325

Jászfalusi, Lajos, **Az időjárás hatása a plankton alakulására a gödöllői halastavakban.** [Effect of weather on plankton development in Gödöllő fish ponds.] *Hidrológiai Közlöny*, Budapest, 35(9/10):353–356, Sept./Oct. **1955.** 3 figs. Russian and German summaries p. 356. **DWB**—Data on plankton amount in samples taken in three Gödöllő fish ponds (May–Oct. 1954) are presented for 5 varieties of phytoplankton and 5 varieties of zooplankton. Variations of plankton amount throughout the season are compared with meteorological data. Several significant correlations are found between plankton development and atmospheric pressure, wind and cloudiness. *Subject Headings:* **1. Weather effects on plankton 2. Plankton 3. Fish ponds.**—*G.T.*

**12C–106** 551.481.1:551.556.8:532.59

Johnson, J. W., **The characteristics of wind waves on lakes and protected bays.** *American Geophysical Union, Transactions*, 29(5):671–681, Oct. **1948.** 11 figs., table, 4 refs., eqs. **DLC**—Results of investigations to determine height and period of waves generated by wind blowing over lakes, reservoirs, or bays, protected from ocean swell, are given. Some information is presented on the variability of wave length and crest length as a function of fetch in the generating area. Further investigation urged. (*Same item as* 11–111, Nov. 1960, and 5K-47, Oct. 1954, *Met. Abstracts.*) *Subject Headings:* **1. Wind-wave energy transfer 2. Lakes.**—*From author's abstract.*

**12C–107** 551.582:551.506(26)(71)

*U. S. Weather Bureau, **Climatology and weather services of the St. Lawrence Seaway and Great Lakes.** Its *Technical Paper*, No. 35, **1959.** 75 p. 33 figs., 10 tables, 16 refs. Review in *Marine Observer*, London, 29(186):203–204, Oct. **1959.** Review by C. Pflugbeil in *Wetterlotse*, Hamburg, 149:173–183, July **1959.** Also: Jones, F. G. C., **The St. Lawrence Seaway and climate of the Great Lakes region of Canada.** *Marine Observer*, London, 29(184):73–77, April **1959.** 3 figs. 2 tables. **DLC**—The economic welfare of Canada in great measure depends on its waterways. The report summarizes the history of Canadian navigation and describes the regions through which the waters flow. Dates of arrival of first ship (and sailing of last ship) from (and to) overseas at Montreal each year from 1949–1958 are given (usually April and Dec., respectively). *Subject Headings:* **1. Climate of Great Lakes region 2. Marine meteorological data 3. St. Lawrence Seaway, Canada 4. Great Lakes, Canada.**—*M.R. and N.N.*

**12C–108** 551.556.8:532.59:551.481.1

Kajiura, K. (*Geophysical Inst., Tokyo Univ.*), **The effects of winds on the stratified lake water.** *Oceanographical Society of Japan, Tokyo, Journal*, 8(2):67–71, Dec. **1952.** 2 figs., 3 refs., 9 eqs. **DWB**—The surface elevation in a stratified lake due to wind stress is essentially related to the thickness of the upper layer, while the depth of the lake itself is not important. The slope of the surface is proportional to the square root of the distance from a point, which is determined by the width of the lake, the depth of the upper layer, the density difference and the wind stress. (*Same item as* 5.11–132, Nov. 1954, *Met. Abstracts.*) *Subject Headings:* **1. Wind stress 2. Wind effects on lakes 3. Lake stratification 4. Water surface slope 5. Lake Suwa, Japan.**—*A.A.*

**12C–109** 551.588.4:551.481.1

Kakas, József, **A Balaton-kutatás éghajlati kérdései.** [Climatic problems of research on Lake Balaton.] *Időjárás*, Budapest, 60(5):305–307, Sept./Oct. **1956. DLC**—In connection with the re-establishment of an Administrative Committee for Lake Balaton, charged with promoting the development of the area, the author stresses the importance of meteorological research in that region. Such research should comprise: a) investigation of the lake-shore and inland climate by the method of descriptive climatology and b) synoptic climatological investigation of the atmosphere over the lake and its vicinity. Results of such research should be applied to storm warning, daily radiation forecasting, forecasting of sailing conditions, and selection of sites for health resorts. The research program would necessitate establishment of new stations including a fast-moving weather ship. (*Same item as* 9.1–279, *Met. Abstracts.*) *Subject Headings:* **1. Climatological research 2. Descriptive climatology 3. Lakes and climate 4. Lake Balaton, Hungary.**—*G.T.*

**12C–110** 627.8:551.482:532.59

Kazakov, A. M., **Raschet kharakteristik volny popuska.** [Calculation of the characteristics of a wave of water released from a dam.] *Meteorologiia i Gidrologiia*, Leningrad, No. 5:37–39, May **1959.** fig., table. **DWB, DLC**—As a result of the release of water of hydroelectric stations into the lower tailwater of a river, an unstable current becomes established when the current velocity remains considerably behind the velocity of wave of disturbance produced by the release. Outside of this section down stream the released waves are added up and the level becomes averaged from the total sum of releases during 24 hours. In order to utilize the Kama River during hydroelectric utilization it is necessary to bring about artificial flooding during critical moments. The conditions providing desired hydrological characteristics are divided into two groups, viz: (1) characteristics for points immediately in the zone of the unstable regime up to 100 km from the weir and (2) characteristics at points a distance of 300–500 km from the weir. An example of the creation of an artificial flood in September of 1957 is described. Detailed data on water level and water flow at the Kama Hydroelectric station, at the Perm and the Sarapul measuring stations are presented. *Subject Headings:* **1. Hydroelectric service stations 2. Hydrologic investigations 3. Kama River.** —*I.L.D.*

**12C–111** 551.481.1(474.5)

Khabazov, E. D., **Izuchennost' i gidrograficheskie osobennosti ozer Litovskoĭ SSR.** [Extent of knowledge and hydrographic characteristics of lakes in the Lithuanian SSR.] *Lietuvos TSR Mokslų Akademija. Geologijos ir Geografijos Institutas, Moksliniai Pranešimai*, 3:72–74, issued Vilna, **1956.**—The history of research on the lakes of the Lithuanian S.S.R. is divided into two stages, namely; the period before 1940 and the subsequent period when the Soviet state was established and the results of studies during these periods are summarized. During both periods 270 lakes were studied and for 170 of these bathometric maps have been prepared. The lakes of Lithuania are numerous and unevenly distributed. The most numerous are lakes of glacial origin of which there are four types; 1) erosional glacial or troughs with basins dug out by subglacial streams; 2) lakes of a terminal moraine landscape associated with depressions between large hillocks of moraine deposits;

3) residual lakes of large glacial lakes situated in zones of glacial lake deposits; and 4) lakes of bottom moraines observed in localities where blocks of continental glaciers are melting. In addition to these glacial lakes, there are lakes in river valleys and karst lakes. *Subject Headings:* **1. Lakes 2. Lithuanian S.S.R.**—*I.L.D.*

**12C–112** 551.579.4:551.481.1(474.5)

Khabazov, E. D., **Osnovnye cherty gidrologicheskogo rezhima ozer Litovskoĭ SSR.** [Basic characteristics of the hydrological regime of lakes in Lithuania.] *Lietuvos TSR Mokslų Akademija. Geologijos ir Geografijos Institutas, Moksliniai Pranešimai*, 3:111–114, issued Vilna, **1956.** 2 tables.—This preliminary survey of the hydrologic characteristics of the lakes of the Lithuanian S.S.R. comprises data and discussions of the annual and seasonal variations of level, thermal conditions and physical and chemical properties of lake water. *Subject Headings:* **1. Lake hydrology 2. Lake level variations 3. Lithuanian S.S.R.**—*I.L.D.*

**12C–113** 551.482.215.78

Kibal'chich, I. A., **Sanitarnoe izuchenie vodokhranilishch v SSSR.** [Study of reservoirs in the U.S.S.R. from the point of view of sanitation.] *Vsesoiuznyĭ Gidrologicheskiĭ S''ezd, Oct. 1957, Trudy*, Vol. 10, issued **1959.** p. 152–158. **DWB**—The scope and purpose of investigations on the sanitation of water reservoirs and canals, as organized by the Ministry of Health of the U.S.S.R., the expansion of research on the sanitation of water reservoirs and canals in the various scientific institutes of hygiene, in the U.S.S.R., etc., are reviewed in general terms. A more detailed account is presented of recent research on the magnitude of limiting permissible concentration of industrial waste and sewage, studies on the contamination of sewage waters in rivers before and after regulation, the effect of mixing of sewage and river water upon the sanitary state of water reservoirs, the relationship between the sanitary state of water reservoirs and seasonal hydrological conditions, etc. These investigations were carried out chiefly on the Kama water reservoir. *Subject Headings:* **1. Reservoir sanitation 2. Kama reservoir 3. U.S.S.R.**—*I.L.D.*

**12C–114** 551.521:551.481.1(472)

Kirillova, T. V., **Radiatsionnyĭ balans vodnoĭ poverkhnosti.** [The radiation balance of a water surface.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, 59(121):16–21, **1956.** 6 figs., 2 tables, 8 refs. **DLC, DWB**—The differences in the radiational balance of a land and water surface are discussed and the results of observations on total reflected radiation and radiational balance made on the Tsimlyansk water reservoir during July 1954 and on Lake Krasavitsa (Leningrad Region) in the spring of 1954 are analyzed. Observations were made on a water surface from a gangway plank on an island, from the bank on a dry grass surface and on sand on the island, with a pyranometer and pyrgeometer (Ianishevskiĭ model); a thermoelectric actinometer was used as a control. The mean daily albedo was 8.2% for water, 39.2% for sand and 21.0% for grass. An analysis of the dependence of albedo upon solar elevation by comparing the theoretical curve for direct and the experimental curve for total radiation for a water surface shows an average difference of 5% in favor of the latter; this includes the effect of scattered radiation as well as that of waves and water turbidity. The mean total daily radiation was 667 cal/cm$^2$ for water, 656 cal/cm$^2$ for sand and 663 cal/cm$^2$ for grass. The radiational balance of the water surface is larger, more stable than that of dry land and grass surfaces; the noon values are of the order of 1 cal/cm$^2$ min at latitudes 60–65°. In the case of water surface the afternoon values of total radiation balance are 0.1 cal/cm$^2$ min greater than the corresponding forenoon values, indicating that the water surface has the maximum of effective radiation during the forenoon. On a given night the nocturnal heat radiation was 36 cal/cm$^2$ for Lake Krasavitsa and 47 cal/cm$^2$ for the dry land. The daily totals of radiational heat were greatest for the water surface both on clear days and days with intermittent cloudiness. The total absorption of radiation by a water surface is 100–200 cal/cm$^2$ greater than that of dry land both on clear and cloudy days. Finally, the values of radiation balance and of its components at a distance of 15 m from the bank adequately characterize the radiational regions of an open reservoir. *Subject Headings:* **1. Radiation balance of water surfaces 2. Lake Krasavitsa, Leningrad Region.**—*I.L.D.*

**12C–115** 551.481.1:551.521(479.25)

*Kirillova, T. V., **Radiatsionnyĭ balans oz. Sevan.** [Radiation balance of Lake Sevan.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 78:25–33, **1958.** 5 figs., 12 tables, 5 refs., 2 eqs. **DLC**—During the summer of 1956 an extensive study was carried out on the incoming radiation at the surface of Lake Sevan, the daily variation of individual components of the radiation balance, the radiational characteristics of the open portion of the lake and the penetration of radiation into the water. The data obtained indicate the following: the mean value of the measured albedo exceeds the theoretically calculated values by 2–4%; in the shore zone the influence of the bottom upon the albedo is very marked, it raises it by 15% in calm weather; the differences in the values of radiation balance of individual parts of the lake during uniform cloudiness amounts to about 10%.

Varying cloudiness over different parts of the Lake Sevan basin alters substantially the values of the radiation balance. One of the causes of the variation between calculated and measured values of total radiation is the use of rather high values of $K (K = Q_0 - Q_n / Q_0 n)$ during computation. During the summer months the radiation balance of the active layer of water in Lake Sevan exceeds the radiation balance over land by 35–40% ; in Sept., Oct. these differences decrease owing to the increase of radiation of the water surface in comparison with that of land and owing to a decreased albedo. *Subject Headings:* **1. Radiation balance of water surfaces 2. Lake Sevan, Armenian S.S.R.**—*I.L.D.*

**12C–116** 551.481.1 :551.521(479.25)

*Kirillova, T. V. and Biurig, R. F., **O razul'tatakh izmereniia podvodnoĭ radiatsii.** [Results of underwater radiation measurements.] *Leningrad, Glavnaia Geofizicheskaia Observatoriia, Trudy,* No. 78 :34–40, **1958.** 6 figs., 5 tables, 2 eqs. **DLC**—During the summer of 1956 the authors measured the radiation penetrating into the waters of Lake Sevan which are characterized by a high degree of transparency. The observations were made from a raft 150 m from the shore and occasionally from a cutter. A modified thermoelectric Ianishevskiĭ pyranometer was used. The construction and operation of the instrument (illustrated by means of photographs) and the observation procedure are described. The calculation of radiation in the water is demonstrated and the values for July and Aug. 1956 are presented in a table. The extinction of radiation with depth is determined from the formula $l_n(Q_0/2) = \alpha Z$ (where $\alpha$ = coefficient of attenuation of radiation, $Z$ = depth). The coefficient $\alpha$ was found to decrease with depth as a result of the varying impact of absorption and scattering of radiation at different depths. The relationship of extinction of radiation $Q/Q_0$ upon solar altitude at various depths was determined and it was found that at low solar elevation the attenuation of radiation was insignificant. With increase in depth the dependence of $Q/Q_0$ upon solar altitude decreased until none existed at a depth of 8.0 m. It is concluded that in the upper layers of water absorption predominates but with increasing depth the role of absorption declines and attenuation is primarily the result of scattering. *Subject Headings:* **1. Underwater radiation measurements 2. Thermoelectric pyranometers 3. Lake Sevan, Armenian S.S.R.**—*I.L.D.*

**12C–117** 551.481.1 :551.521

Kirillova, T. V., **Radiatsionnyĭ balans oz. Balkhash.** [The radiation balance of Lake Balkhash.] Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy, No. 78 :125–131, **1958.** 2 figs., 12 tables, 3 refs., 2 eqs. **DLC**—Actinometric observations carried out during June-Oct. 1955 at the station Mzuk-Aral, located on the shores of Lake Balkhash and also at other actinometric stations were used to determine the radiational balance of Lake Balkhash : Monthly total values of radiational heat at Mzuk-Aral including total radiation albedo long wave radiation balance and computed monthly values of the coefficient determining the absorption of radiation by land cover are presented. For determining the radiation characteristics of Lake Balkhash data are presented on the monthly radiation balance and effective radiation for six stations along the shores of the lake. The radiation balance of the water surface was calculated by the equation $B = B' + Q(A' - A) + 4oT^3(T' - T)$ where $B'$ = radiation balance over land $A'$ and $A$ = albedo of the water surface and land respectively. $Q$ = total radiation. $T'$ and $T$ absolute temp. of water and soil surface. The radiational balance of the water surface exceeds that of land by two times during all summer months. Such large differences are explained both by high albedo values and large land-water temp. differences. *Subject Headings:* **1. Radiation balance of lakes 2. Actinometric observations 3. Lake Balkhash, U.S.S.R.** —*I.L.D.*

**12C–118** 551.482.215.78 :551.573(791)

*Koberg, Gordon E. (*U. S. Geological Survey, Denver*), **Effect on evaporation of releases from reservoirs on Salt River, Arizona.** *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Bulletin,* No. 19 :37–44, Sept. **1960.** 4 figs., 3 tables, 7 refs. **DWB, DLC**—By means of the energy-budget method, measurements of evaporation losses from four reservoirs on Salt River, Ariz. were determined to range from 57.5 to 69.9 in. for the 12-month period April 1958 to March 1959. Water is withdrawn from Roosevelt Lake at considerable depth and released through three run-of-the-river reservoirs. Because the water released from Roosevelt Lake is cold, evaporation losses from the downstream reservoirs are considerably lower than those from Roosevelt Lake. Evaporation pan coefficients computed for the various reservoirs ranged from 0.53 to 0.65. A base evaporation rate was computed for each reservoir as the evaporation rate that would have occurred had there been no change in energy storage and the net advected energy equalled zero during the year. *Subject Headings:* **1. Evaporation from reservoirs 2. Salt River, Ariz.**—*Author's abstract.*

**12C–119** 551.526.8 :551.481.1

Kolesnikov, A. G. and Pivovarov, A. A., **K raschetu osennego okhlazhdeniia vodokhranilishch.** [Calculations of the cooling of reservoirs during autumn.] *Akademiia Nauk SSSR, Doklady,* Moscow, 93(6) :1015–1018, Dec. 21, **1953.** ref., 12 eqs. **DLC**—The period of ice formation is an important one, but its beginning cannot be determined without taking into account the characteristics of the preceding autumn when water is cooling. This period is analyzed for a water body with depth "h" and of sufficient extent. Equations are based on the values of total radiation, effective radiation from pyrgeometer air temperature, water vapor pressure and wind velocity. Heat extension is governed by turbulent exchange of such intensity that the coefficient of exchange $K_1$ does not depend upon depth. The author derived equations for calculation of water temperature variations with depth and with time during the entire autumn cooling period. (*Same item as* 6.6–236, *Met. Abstracts.*) *Subject Headings:* **1. Water temperature variations 2. Ice formation 3. Lakes and reservoirs.**—*N.T.Z.*

**12C–120** 551.526.8:551.481.1(438)

Kondracki, Jerzy, **Obserwacje nad termika jeziora Niegocin na stacji naukowej Polskiego towarzystwa geograficznego w gizycku (1949–1951).** [Observations on thermal conditions of Lake Niegocin.] *Przegląd Geograficzny,* Warsaw, 24(3):49–71, **1952.** 6 figs., tables, 7 refs. In Polish; Russian and English summaries p. 69–71. **DLC**—Results of observations of water temperature and ice conditions of the lake, carried out during the period 1949–1951 at the scientific station of the Polish Geographical Society at Giżycko, are presented and discussed. In spite of a greater amplitude of oscillation of the air temperature, water temperature was generally higher in summer than the mean air temperature. Characteristic features of the thermal conditions are: 1) relatively low position of the thermocline in summer; 2) strong cooling of the water in winter caused by the shallowness of the lake and its large surface area (3–4½ months covered with ice. (*Same item as* 5.8–155, May 1954, *Met. Abstracts.*) *Subject Headings:* **1. Heat balance of lakes 2. Limnology 3. Lake Niegocin, Poland.**—*A.M.P.*

**12C–121** 551.481.1

Kondracki, Jerzy, **Geograficzne badania jezior w ZSRR.** [Geographical investigation of lakes in the U.S.S.R.] *Przegląd Geograficzny,* Warsaw, 31(2):371–378, **1959.** 5 foot-refs. Polish summary p. 371. Russian and English summaries p. 378. **DWB**—A report on the activity of the most important scientific organizations engaged in geographical studies of lakes in the U.S.S.R. in Moscow, Leningrad and Vilnyus visited by the author between Sept. 22 and Oct. 2, 1958. It was found that the work performed by the Laboratory of Lake Studies of the U.S.S.R. Academy of Sciences in Leningrad covers the widest scope of investigations including complex surveys by expeditions, as for example, of Ladoga Lake and the steppes of the Caspian Coast. Investigations carried out by the Institute of Geology and Geography of the Lithuanian Academy of Sciences have given interesting results in the field of morphometry, statistics and history of development of lakes in the post-glacial period. *Subject Headings:* **1. Lake studies 2. U.S.S.R.**—*A.M.P.*

**12C–122** 551.579.4:551.481.1(478)

†Konovalova, V. I., **Ozero Seliger.** [Seliger Lake.] *Voprosy Geografii,* Moscow, No. 26:267–274, **1951.** 2 figs., bibliog. p. 273–274. **DLC**—The lake is located in the Upper Volga basin. Water level observations presented since 1847 show some variations but do not indicate definite climatic changes. Considerable trend in duration of ice cover (decrease of 20% since 1851). Water balance computed for three characteristic years. *Subject Headings:* **1. Water level variations 2. Lake level data 3. Hydrologic cycle 4. Climatic variations 5. Seliger Lake, Kalinin Region, U.S.S.R.**—*A.A.*

**12C–123** 551.46.018.3(479.24)

Kopaĭgorodskiĭ, E. M., **Rezul'taty analiza struktury techeniĭ v Apsheronskom raĭone Kaspiiskogo moria.** [Results of an analysis of the structure of currents in the Apsheron region of the Caspian Sea.] *Meteorologiia i Gidrologiia,* Leningrad, No. 7:39–41, July **1958.** fig., eq. **DWB, DLC**—The author investigated the results of current velocity measurements in the Apsheron district by means of a rotating current meter and the letter printing rotating meter of ALEKSEEV. Measurements made during different weather conditions varied with time so that two minute averages of current measurements made every five minutes (illustrated by a graph) varied considerably. The probability of short period deviations of current velocity from the mean were computed by means of amplitude pulsations; the coefficient of pulsation $K = V/V_m$, where $v$ =current velocity (average of 2 min.) and $V_m$ =mean hourly velocity. For a 5 m horizon the coefficient of pulsation deviated from unity by 0.20 in both directions in 74% of the cases (between Zhilyi Island and Neftianyi Kamorii district); the probability of short period deviations of current flow within the limits of ±20% from the mean was 74%. The maximum value of $K$ was 2.0. In general the stability of flow depended upon the mean velocity of a current; with increasing mean velocity the current became more stable and the coefficients of pulsation decreased. But even in the case of considerable mean current velocities, measured with a marine rotating current meter, the values may deviate perceptibly from the mean. The decrease in the coefficients of pulsation was observed also in the transition to areas of the sea with considerable depth. Accordingly significant pulsations of currents were observed both along coastal areas, as well as in the open sea. It is suggested that the method of measuring marine currents should be altered. In those cases when special current investigations are made the rotating current meter should remain at each horizon at least one half hour in order to obtain mean current velocities. *Subject Headings:* **1. Sea current calculations 2. Current velocities 3. Ocean current measurement techniques 4. Apsheron Peninsula, Azerbaidzhan S.S.R.**—*I.L.D.*

12C–124 551.579.5:551.312.2

Korchunov, S. S., **Issledovanie dvisheniia vlagi v verkhnem sloe osushennoĭ torfianoĭ zalezhi i primenenie integrayorov dlia rascheta i prognoza vodnogo rezhima.** [Investigation on the movement of moisture in the upper layer of a dried peat bed and the use of integrators for calculating and forecasting the water regime.] *Vsesoiuznyĭ Gidrologicheskiĭ S''ezd, Trudy* (of 3rd Conference, Oct. 1957), Vol. 7, issued **1959.** p. 150–156. 3 figs., 12 refs., 4 eqs. **DWB** (M79 V985tr)—For the study of water circulation in a drained peat layer, the potential of humidity is used. This is measured by tensiometers specially constructed for the purpose. Two years of observation (1956–57) were carried out. Unit water capacity $C_b$ is expressed by equation $C_b = -(\partial W/\partial \Phi)_{t,\gamma_0,p}$ where $W$ = water content, $\Phi$ = potential of humidity, $t$ = temperature, $\gamma_0, p$ = other factors; humidity potential for isothermic conditions is expressed in differential flow equation. This equation is then solved by computers (integrators). American authors A. A. KLUTE, P. R. DAY and J. N. LUTHIN are mentioned. *Subject Headings:* **1. Peat moisture capacity 2. Forecasting moisture content in peat.**—*J.N.*

12C–125 551.482.215.78:551.482.214

Kriventsov, M. I., **K voprosu o prognoze khimicheskogo sostava vody vodokhranilishch.** [Forecasting the chemical composition of waters of reservoirs.] *Vsesoiuznyĭ Gidrologicheskiĭ S''ezd, Oct. 1957, Trudy,* Vol. 10, issued **1959.** p. 134–138. fig., table, 3 refs. **DWB**—In the computation of the expected mineralization and composition of water of flowing reservoirs, the reservoir is regarded as a river in a state of transformation. The water arriving in the upper reaches of the reservoir gradually fills the latter, taking the place of the water consumed from it and this water moving into the dam, mixes with the water of the tributaries and underground water; with water from atmospheric precipitation and the water from melted ice. During this movement of the water to the dam, mixing occurs with the preceding displaced water of the reservoir. The degree of influence of preceding water upon the mineralization and constitution of water of the period considered, depends upon the rate of change of water in the water reservoir, morphology of the reservoir and other factors. On the basis of these assumptions the formula used to calculate mineralization of water in a reservoir is

$$M_k = \frac{M_n V_n + M_{pr} W_{pr} - 0.5 M_n W_{st}}{V_H + W_{pr} - 0.5 W_{st} - L_{isp}}$$

$M$ = mean mineralization or mean content of ions in a particular volume of water; $W$ = volume of water, arriving or discharged from the reservoir for the period calculated; $L$ = volume of water lost from a reservoir; $n$ = index for beginning of calculation period; $K$ = index for end of the same period; $pr$ = influx; $st$ = discharge; $isp$ = losses by evaporation. *Subject Headings:* **1. Chemical composition of reservoir water 2. Reservoirs.**—*I.L.D.*

12C–126 551.579:551.481.2 551.326.81:551.481.2

†Kühlmann, Dietrich H. H., **Wasserführung und Eisverhältnisse zweier Kleingewasser.** [Water flow and ice conditions of two ponds.] *Acta Hydrophysica,* Berlin, 6(2):97–126, **1960.** 8 figs., 4 tables, 22 refs. German summary p. 97. **DLC**—In 1955–56 two small water bodies were observed. One was a forest pond, the other a depression in a meadow. The characteristics and seasonal changes are noted. Special emphasis is placed on the ice accumulation, duration, and dissipation in each situation. *Subject Headings:* **1. Forest pond seasonal changes 2. Seasonal changes in meadow ponds.**—*E.Z.S.*

12C–127 551.332:551.481

Kullengberg, B. (*Göteborg*), **On the presence of sea water in the Baltic ice-lake.** *Tellus,* Stockholm, 6(3):221–228, Aug. **1954.** 5 figs., 2 tables, 2 refs., 4 eqs. **DLC**—A discussion of the salinity of the interstitial water in five sediment cores from the Baltic containing mainly glacial deposits appears to prove that the Baltic ice-lake contained sea water during the early stage when only the South Baltic was laid free by the retreating ice. *Subject Headings:* **1. Ice age deposits 2. Baltic Ice-Lake.**—*Author's abstract.*

12C–128 551.577:551.573:551.481.1(479.25)

Kuznetsov, I. A., **Ispol'zovanie vodnykh resursov Sevana.** [Utilization of the water resources of Sevan Lake.] *Priroda,* Moscow, 45(12):87–90, Dec. **1956.** 2 figs., 2 photos. **DLC**—A description of the hydrology and water balance of Lake Sevan, Soviet Armenia. A schematic map of the basin of Lake Sevan, and photographs of the lake and of a hydroclimatic station built on it are presented. *Subject Headings:* **1. Hydrologic cycle 2. Water balance of lakes 3. Lake Sevan, Armenian S.S.R.**—*I.L.D.*

**12C–129** 551.481.1(572)

Lamakin, V. V., **Nazrevshie problemy Baĭkala.** [Imminent problems of Lake Baikal.] *Priroda*, Moscow, No. 2:57–64, Feb. **1959.** 11 photos. **DLC**—The history of scientific investigations on the Lake Baikal region during the nineteenth and early part of the twentieth century, the existing scientific institutions engaged in research on the natural history of the lake and the surrounding region and present knowledge on the tectonics, geology, seismology and physical geography of this region, the origin of the lake and its hydrology and limnology are summarized. *Subject Headings:* **1. Lake studies 2. Lake Baikal, Siberia.**—*I.L.D.*

**12C–130** 577.4(7:285) 551.481.1(7:285)

*†Langlois, Thomas Huxley (*Dir., Stone Inst. Hydrobiology, Ohio Univ.*), **The western end of Lake Erie and its ecology.** Ann Arbor, Mich., J. W. Edwards, Pub., Inc., **1954.** 479 p. 72 figs., 26 tables, bibliog. p. 422–457. **DLC** (QH98.L3)—In a readable text on the hydrobiology of western Lake Erie, sections on climate (p. 25–33), on wind and waves (p. 34–38), on water masses (p. 39–58), on pollution (p. 59–63), on shoreline processes (p. 63–76) and on winter ice (p. 76–85) follow a section on the geography in Ch. II, which deals with the **Physical environment;** considerable data are presented in tables and graphs. The remainder of the book is devoted to descriptions of various types of living organisms in the Lake. (*Same item as* 11.5–2, *Met. Abstracts.*) *Subject Headings:* **1. Ecology of Lake Erie 2. Limnology 3. Lake Erie, United States.**—*M.R.*

**12C–131** 551.526.8:551.48(439.1)

Lászlóffy, Woldemár, **Folyóink és tavaink hőmérsékleti viszonyai.** [Temperature conditions of rivers and lakes in Hungary.] *Hungary. Vízgazdálkodási Tudományos Kutató Intézet, Beszámoló . . . évi munkájáról*, 1955:131–146, pub. **1956.** 3 figs., 4 tables, 11 refs. Russian and French summaries p. 366–367. **DWB**—Monthly and annual means of water temperature (1946–1952) are tabulated for 16 rivers and 2 lakes in Hungary, measured at 35 points. Diurnal variations are discussed. Comparative curves of water and air temperature are presented. In the lakes (shallow ones), water temperature is found to be more closely related to air temperature than in rivers. (*Same item as* 9.3–196, *Met. Abstracts.*) *Subject Headings:* **1. Lake temperatures 2. River temperatures 3. Diurnal water temperature variations 4. Hungary.**—*G.T.*

**12C–132** 551.588.4(7:285)

Lautzenhiser, R. E. (*U. S. Weather Bureau, Chicago*), **Great Lakes weather.** *Weatherwise*, 6(1):3–6, Feb. **1953.** figs. **DWB**—The effect of water masses of the Great Lakes upon the weather of surrounding areas is investigated. Such effects are found in excessive snowfalls, increased aircraft icing, delay of spring blooming season, lake breezes, changes in barometric pressure, temperature and humidity, etc. Isothermal and isohyetal charts of the region are presented. The author also discusses some weather features of the area which are not influenced by water masses. (*Same item as* 4.11–265, *Met. Abstracts.*) *Subject Headings:* **1. Lake influence 2. Great Lakes Region.**—*G.T.*

**12C–133** 551.583.3:551.481(6)

Leakey, L. S. B., **The stone age cultures of Kenya Colony.** Cambridge, University Press, **1931.** 283 p. **DLC**—**Climatic changes** (p. 6–18) summarizes changes of level of Lake Nakuru as First and Second major pluvials, the second being double, and First and Second post-pluvial wet phases. Similar variations are described in Uganda and Tanganyika. Correlation with Europe discussed by C. E. P. Brooks, p. 267–270. (*Same item as* G–85, July 1950, *Met. Abstracts.*) *Subject Headings:* **1. Climatic changes 2. Lakes 3. Africa.**

**12C–134** 551.481:061.3(493)

Lenz, Fr., **Internationaler Limnologen-Kongress in Belgien.** [International Limnology Conference in Belgium.] *Naturwissenschaftliche Rundschau*, 4(1):33, Jan. **1951.** **DWB**—Brief note on conference at Ghent, Brussels, Lowen and Lüttich, Aug. 16–26, 1950. There were 90 delegates (6 from Germany) from 19 countries and 45 papers were read. The 12th conference will be held in England (1953) and the 13th in Finland (1956). The previous one was held at Zurich in 1948. (*Same item as* 6.7–63, *Met. Abstracts.*) *Subject Headings:* **1. Limnology conferences 2. Belgium.** —*M.R.*

**12C–135** 551.48.018:532.59:551.481.1

Levchenko, S. P., **O metodakh izmereniia voln na ozerakh i vodokhranilishchakh.** [Methods of measuring waves in lakes and water reservoirs.] *Vsesoiuznyĭ Gidrologicheskiĭ S''ezd, Trudy*

(Proceedings of the 3rd All Union Hydrological Conference, Oct. 1957). Vol. 4, issued **1959.** p. 110–116. 5 figs., 7 eqs. **DWB** (M79 V985tr)—Descriptions of a photographic wave recording instrument, an electric contact wave recording instrument and an optical instrument illustrated with figures and line drawings. All instruments were developed by the Oceanic Hydrophysical Institute. *Subject Heading:* **1. Wave recording instruments.**—*J.N.*

12C–136 628.13:532.593:629.122

Levchenko, S. P., **Vozdeĭstvie voln v vodokhranilishchakh na rechnye suda.** [The action of waves in water reservoirs on river boats.] *Vsesoiuznyĭ Gidrologicheskiĭ S"ezd, Trudy* (Proceedings of the 3rd All Union Hydrological Conference, Oct. 1957), Vol. 4, issued **1959.** p. 124–127. **DWB** (M79 V985tr)—Nine different size steam- and motorboats on large reservoirs were equipped with instruments to record the characteristics of waves. Description of instruments and results of observation are given. Conclusions show that design of several boats does not meet requirements for resistance to observed waves. *Subject Headings:* **1. Wave recording instruments 2. Boat design.** —*J.N.*

12C–137 551.481.1(05) 551.46(05)

**Limnology and Oceanography,** Baltimore, Md., Vol. 1, No. 1, Jan. **1956.** Latest issue seen, Vol. 4, No. 4, Oct. **1959.** Quarterly. Issued by American Society of Limnology and Oceanography. Price: to nonmembers; $10.00 from Society, Woods Hole, Mass. Free to members with annual dues of $7.50. **DLC** (GC1.L5)—The Limnological Society of America was organized on Jan. 1, 1936 and the American Society of Limnology and Oceanography in 1948. The present journal was started in Jan. 1956 to provide an outlet for publication of scientific papers on all aspects of physical, chemical, geological and biological oceanography and limnology. Papers are of a uniformly high caliber, with ample quantitative data (charts, graphs and tables), well-documented by extensive reference lists and with good informative author's abstracts. (*Same item as* 10.4–21, *Met. Abstracts.*) *Subject Headings:* **1. Limnology periodicals 2. Serial publications 3. Oceanography periodicals 4. American Society of Limnology and Oceanography.**—*M.R.*

12C–138 551.461.2:532.594

Lisitzin, Eugenie (*Inst. of Marine Res., Helsinki*), **Uninodal seiches in the oscillation system Baltic proper Gulf of Finland.** *Tellus,* Stockholm, 11(4):459–466, Nov. **1959.** 3 figs., 4 tables, 4 refs. **DLC**—Seventeen cases of regular sea level oscillations with at least four distinctly developed periods recorded at Hamina (Fredrickshamn) in the east part of the Gulf of Finland during the years 1952–1954 were selected and the period corresponding to the maximum amplitude computed numerically. The results show that this period is fairly constant with an average of 26.2(±0.2)hours. Sea level records at Władysławowo on the Polish coast confirm this period as a uninodal seiche in the oscillation system Baltic proper—Gulf of Finland. In the paper is also discussed the possible occurrence of transversal oscillations in the Gulf of Finland and the probability of the participation of the Bay of Kiel at the named seiches in the Baltic. *Subject Headings:* **1. Sea level variations 2. Seiches 3. Gulf of Finland 4. Baltic Sea.**—*Author's abstract.*

12C–139 551.579.5:551.312.2(476)

Lundin, K. P., **Vodopronitsaemost' i vodottdacha torfianoĭ zalezhi.** [Water permeability and water yield of a peat deposit.] *Vsesoiuznyĭ Gidrologicheskiĭ S"ezd, Trudy* (of 3rd Conference, Oct. 1957), Vol. 7, issued **1959.** p. 156–164. 3 figs., 3 tables, 4 refs. **DWB** (M79 V985tr)—The water permeability of peat deposits depends mainly on its density. Experiments in Byelorussia show that the permeability coefficient depends also on the decomposition of peat. Formulas for both are given. Permeability in connection with drainage of peat is discussed. Drainage diminishes the coefficient of permeability of 5–30 times. The runoff from peat deposit is evaluated from a formula using the above mentioned permeability coefficient and directions are given for drainage design. *Subject Headings:* **1. Peat permeability 2. Permeability coefficient 3. Byelorussian S.S.R.**—*J.N.*

12C–140 551.326.8:551.322:551.48

*Lutkovskiĭ, Sergeĭ Vasil'evich, **Obrazovanie l'da v ozerakh, rekakh i moriakh.** [Formation of ice in lakes, rivers and seas.] Moscow, Akademiia Nauk SSSR, **1957.** 114 p. 33 figs., 6 tables, 12 refs. **DWB** (551.311 L973ob)—A pamphlet taking up the various aspects of river, lake and sea ice from crystal formation to ice forms, ice formation, growth, physics, properties, distribution in Arctic, movements, deformation, influence of hydrometeorological factors, disappearance and forecasting. Special forms of ice are illustrated. Some of the properties and the distribution are given in illustrative tables or graphs. (*Same item as* 10.1–25, *Met. Abstracts.*) *Subject Headings:* **1. Ice formation 2. Ice properties 3. Sea ice 4. River ice 5. Lake ice.**—*M.R.*

**12C–141** 551.573:551.481.1

McEwen, G. F., **Results of evaporation studies conducted by the Scripps Institution of Oceanography and the California Institute of Technology.** *California, Univ. Scripps Institution of Oceanography, Technical Ser.*, 2(11):401–415, **1930.** 12 refs., 22 eqs. **DLC**—Summary of investigations of evaporation from large exposed bodies of water, involving observations on fresh water lakes and on small containers under laboratory conditions, keeping evaporation from the sea in mind. (*Same item as* K 24, Oct., 1950, *Met. Abstracts.*) *Subject Headings:* **1. Evaporation 2. Lake surfaces.**

**12C–142** **551.579.4**:551.481.1(520) 551.579.2(520)

*Magono, Choji and Orikasa, Keitaro, **Hydrological investigation in the Lake Shikaribetsu Basin.** *Sapporo, Japan. Hokkaido Univ., Faculty of Science, Geophysical Bulletin,* 5:45–65, Oct. **1957.** 10 figs., 15 tables. In Japanese; English summary p. 65. **DWB**—Taking over the work of Higashi and colleagues, the authors surveyed the snow cover and rainfall in the Lake Shikaribetsu Basin, Hokkaido through 1955 and 1957, and obtained following results: 1) The maximum annual variation of the snow cover in late March in the basin was about 20%. 2) The correction coefficient of snow cover for forest area, that is, the ratio of snow cover in the forest area to that of the open area, hitherto taken as 85% should be changed to 70%. 3) It may be true that the rainfall in the forest area is smaller than that in the open area. 4) The runoff coefficients in summer were found to be smaller than those in winter, but the coefficient through the whole year was about 80%, therefore, it is considered that there are no special leakage points of water in the basin. 5) A reasonable part of autumn rainfall ran off in winter, and melted snow cover ran off gradually in summer, so that the coefficient of runoff in the snow melting season appears to be too small. 6) The amount of the rise in the water level of the lake may be forecast by the total amount of snow cover in late March by the following formula with an accuracy of 10%: $H = 1.11 \times 10^{-7}(A + 11.0 \times 10^{6})$ m, where $A$ is the amount of the total snow cover in the basin. 7) The effect of heat flow from the earth's surface on snow melting has been considered but the effect is not yet known clearly. *Subject Headings:* **1. Snow cover variations 2. Runoff 3. Snow melt runoff 4. Water level forecasting 5. Lake Shikaribetsu Basin, Hokkaido.**—*Authors' abstract.*

**12C–143** 551.521:551.463

*Mahringer, W., **Über die spektrale Lichtdurchlässigkeit des Traunsees.** [Spectral penetrability of Lake Traun.] *Wetter und Leben,* Vienna, 10(1/2):24–28, Jan. **1958.** fig., 6 tables, 3 refs. **DLC**—Measurements on spectral penetrability in Lake Traun were carried out with a Lunz underwater photometer and a series of filters (ultraviolet, infrared, etc.). The measurements were made during July–Sept. at 1 m depths up to 11 m. Lake Traun is a lake of relatively large penetrability with a broad maximum in the green, but variations about this maximum involving a displacement towards longer wave lengths occur. Turbidity reduces the penetrability of short wave lengths more than of long wave lengths. Except for the uppermost meter layer, the penetrabilities showed only slight differences up to a depth of 11 m, solar altitude and wave movement also influence penetrability. *Subject Headings:* **1. Spectral light penetration in sea 2. Spectrophotometers 3. Traun Lake, Austria.**—*I.L.D.*

**12C–144** 551.468:551.465:532.594:551.326.7

Malinina, T. I., **O seĭshakh iakkimavarskogo zaliva ladozhskogo ozera podo l'dom.** [The Iakimvar Bay (Ladoga Lake) seiches under ice cover.] *Vsesoiuznoe Geograficheskoe Obshchestvo, Leningrad, Izvestiia,* 91(2):156–169, March/April **1959.** 6 figs., 2 refs. **DWB, DLC**—The results of studies on the oscillation of a water surface under ice cover carried out in 1958 in Iakimvar Bay of Lake Ladoga, are presented in graphs and analyzed. The installation of the microclinometers at two posts, one near the shore and the other in the middle of the bay, is described. It was found that seiches occur in winter when the lake is entirely covered with ice; in April 1958 a seiche of two periods was observed—about 56 min. and 10 min.; periodic oscillation movements are carried out by the ice covering the Iakimvar Bay, and the period of oscillation of the ice corresponds to that of the water. *Subject Headings:* **1. Seiches 2. Lake ice effect on seiches 3. Ladoga Lake, European U.S.S.R.**—*I.L.D.*

**12C–145** 551.481.1:532.594

Malinina, T. I., **O odnouzlovaia seĭsha Iakimvarskogo zaliva Ladozhskogo ozera.** [Uninodal seiche of Iakimvar Bay (Ladoga Lake).] *Vsesoiuznoe Geograficheskoe Obshchestvo SSSR, Leningrad, Izvestiia,* 92(3):274–276, May/June **1960.** 2 figs., 3 refs. **DWB, DLC**—The existence and characteristics of a uninodal seiche of Iakimvar Bay was determined and calculated by the theoretical method of Defant, the procedure of which is outlined. Both the theoretical results of Defant and verification with the aid of the microlimnograph system of V. P. Matveev are presented. It is shown that (1) independent uninodal seiches exist in Iakimvar Bay of Lake Ladoga, (2) the period of the seiche is 22 min., (3) the node of the basic longitudinal seiche of the Bay is located 7 km from the western end of the Bay, and (4) the amplitude at Lakhdepokh'ia is almost 3.5 times higher than at the opposite end of the Bay. *Subject Headings:* **1. Seiches 2. Ladoga Lake, European U.S.S.R.**—*I.L.D.*

**12C-146** 551.579:551.481.1

Man'ko, M. A., **Osobennosti pod''ema urovnia ozer v Zaural'skoĭ lesostepi v 1941–1951 gg. i uchastie v pitanii ozer gruntovykh vod.** [Characteristics of the rise of the water level of lakes in the Trans-Urals forest steppe in 1941–1951 and the contribution of ground water to the recharge of the lakes.] *Vsesoiuznyĭ Gidrologicheskiĭ S''ezd, Trudy* (Proceedings of the 3rd All Union Hydrological Conference, Oct. 1957), Vol. 4, issued **1959.** p. 282–289. fig., 9 refs. **DWB** (M79 V985tr)—The water level of lakes in the Trans-Ural forest steppe started to rise in the 1940s. It was not simultaneous in all lakes. Beginning in 1949, the level dropped again and by 1954 all lakes were at their original level. An examination of water stage data with simultaneous hydrometeorologic and climatic data shows that the lakes are closely related to the ground water regime. This permits their classification into five regions based on the hydrology of ground water of the region. *Subject Headings:* **1. Water level variations 2. Ground water hydrology 3. Trans-Urals, U.S.S.R.**—*J.N.*

**12C-147** 551.326.85:551.481.1

†Marcus, Melvin G. (*Univ. Chic.* (*home, Vineland, N. J.*)), **Periodic drainage of glacier-dammed Tulsequah Lake, British Columbia.** *Geographical Review,* N. Y., 50(1):89–106, Jan. **1960.** 13 figs., 2 tables, 24 foot-refs. **DWB, DLC**—Among the several types of ice dammed lakes which drain periodically is one which is formed by the retreat of a tributary arm from the trunk glacier. Tulsequah Lake, on the eastern margin of the Juneau Ice Field in British Columbia is such a lake. This lake, impounded by a distributary arm of Tulsequah Glacier, has been draining annually for at least 17 years and is known to have drained periodically for at least 50 years. The present paper studies its drainage mechanics and lake development. First, the site of the lake is described and its historical development traced. Later, drainage frequency and mechanics are discussed. The study is extensively illustrated by photographs and diagrams. In conclusion it is stated that Tulsequah type lakes do not drain according to a single, simple principle. Jokulhlaups (a term used in Iceland for a glacial outburst, which may or may not be associated with volcanic activity) are produced by a complex of interdependent forces, all acting in definite sequence. If one set of conditions is not met, the others will not follow. *Subject Headings:* **1. Lake ice movement 2. Lake hydrology 3. Tulsequah Lake, British Columbia.**—*I.S.*

**12C-148** 551.481.1:551.551

Matveev, L. T., **Issledovanie turbulentnoĭ struktury vozdushnogo potoka v raĭone oz. Sevan s pomoshch'iu samoleta.** [Airplane investigation of the turbulent structure of the air current in the Lake Sevan region.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy,* No. 78:84–97, **1958.** 4 figs., charts, 6 tables, 8 refs. **DLC**—The turbulent structure of the atmosphere at different levels was investigated by means of airplane soundings carried out over the valley of the Zanya River near the shores of Lake Sevan, over Lake Sevan and also over the mountains. Equations are given for calculating (1) the vertical components of the velocity of air currents from the left of the airplane measured by means of an accelerograph, (2) the fluctuation of the aerial velocity of the aircraft, (3) the horizontal dimensions of turbulence vortices and (4) the coefficient of turbulence. The relationship between the coefficient of turbulence and the fundamental physical parameters upon which thermodynamic stability and turbulent mixing of the atmosphere depend is discussed; these parameters are vertical gradient of temp. and wind velocity, mean wind velocity along the horizontal axis and mean temp. and acceleration of gravity. An equation for calculating the turbulence coefficient from data of temp.-wind soundings of the atmosphere is developed. Data are presented on the mean values of horizontal dimensions of turbulence vortices, frequency of semi periods of lifts for different underlying surfaces, values of the turbulence coefficient in the vicinity of Cape Naroduz, results of analysis of the accelerograph tape etc. *Subject Headings:* **1. Turbulence over lakes 2. Lake Sevan, U.S.S.R.**—*I.L.D.*

**12C-149** 551.573:551.481.1

Maurer, J. and Peppler, W., **Verdunstung von freien Wasserflächen.** [Evaporation from free water surface.] *Zeitschrift für Angewandte Meteorologie,* 53:313–323, **1936.** 5 tables, refs. **DWB**—Tables of evaporation from free water surfaces are given for different lakes in different climate conditions. (*Same item as* K–55, Oct., 1950, *Met. Abstracts.*) *Subject Headings:* **1. Evaporation 2. Lake surfaces.**

**12C-150** 551.526.8:551.481.1

Melin, Ragnar, **Currents caused by water flowing through lakes.** *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Oslo,* 1948, [*Transactions*], Vol. 1:373–377, [1950?]. 6 figs., ref. **DWB**—In connection with a study of currents, artificially increased by discharge from storage reservoirs during the winter, temperature-depth distribution and ice profiles are presented for Lake Kallsjön. (*Same item as* 6.9–197, *Met. Abstracts.*) *Subject Headings:* **1. Lake temperatures 2. Ice cover 3. Lake Kallsjön, Sweden.**—*A.A.*

**12C–151** 551.573:551.481.1

*Meyer, Adolph F., **Evaporation from lakes and reservoirs; a study based on fifty years' Weather Bureau records.** Minnesota Resources Commission, **1942.** 111 p. 9 figs., 35 maps, graphs, 4 tables. **DLC**—Monthly and annual evaporation from lakes and reservoirs in the U. S., as determined by this study, are presented in the form of maps, graphs and tables, for use in design, construction, operation and maintenance of works using water; for use in agriculture and forestry and for use in further meteorologic and hydrologic studies. Appendix includes graphs of hydrological elements at 168 stations; maps of mean vapor pressure for each month, Jan. to Dec. and of mean evaporation for each month. (*Same item as* K–116, Oct. 1950, *Met. Abstracts.*) *Subject Headings:* **1. Evaporation 2. Lakes and reservoirs 3. Vapor pressure 4. United States.**

**12C–152** 551.526.8:551.481.1(7:285)

*Michigan. Water Resources Commission, **Great Lakes water temperatures along Michigan's shoreline at municipal sources.** Dec. **1954.** 52 p. map, tables. **DLC** (QC909.M5)—Monthly average, maximum and minimum water temperatures for 1953 for 20 stations in Michigan along Lake Superior, Michigan, Huron, St. Clair, Detroit River and Lake Erie are presented in tables along with intake data (depth below surface that water was obtained) and chemical analyses. A map shows location of the stations. *Subject Headings:* **1. Lake temperatures 2. Great Lakes 3. Michigan.** —*M.R.*

**12C–153** 551.508.824:628.13

Mogil'ner, I. N. and Shevchenko, F. N., **Avtomaticheskaia radiometeorologicheskaia stantsiia dlia vodokhranilishch (ARIV-52).** [Automatic radiometeorological station for water reservoirs (ARIC-52).] *Leningrad. Nauchno-Issledovatel'skiĭ Institut Gidrometeorologicheskogo Priborostroeniia, Trudy,* No. 7:36–51, **1959.** 10 figs., 2 tables, ref. **DWB**—In order to provide data on wind speed and direction over reservoirs which are in the path of the routes of river fleets, the automatic radiometeorological station ARIC-52 has been devised. It is an automatically operating aggregate of apparatus which measures and transmits by radio, to a distance of 100 km, data on mean wind velocity and direction, atmospheric temperature and humidity and on water temperature. The accuracy with which the station operates is discussed and a description, with the aid of diagrams and photographs, is given of the construction and operation of the instrumentation and of the installation of the station. The results of controlled measurements are presented in a table. *Subject Heading:* **1. Radiometeorological stations for reservoirs.**—*I.L.D.*

**12C–154** 551.501.1:551.579:551.481.1(47)

Molchanov, I. V., **Metodicheskie osnovy nabliudeniĭ na ozernykh stantsiiakh i postakh Gidrometsluzhby SSSR.** [Methodological principles of observations at lake stations and posts of the Hydrometeorological Service of the U.S.S.R.] *Vsesoiuznyĭ Gidrologicheskiĭ S''ezd, Trudy* (Proceedings of the 3rd All Union-Hydrological Conference, Oct. 1957), Vol. 4, issued **1959.** p. 5 14. **DWB** (M79 V985tr)—After an historical survey of development of observations on lakes in the U.S.S.R., present extent of observations is described on basis of a **Handbook of Instructions.** For this purpose, lakes are classified into three groups: large lakes (area more than 2000 sq km, average depth over 18 m); medium lakes (area from 100–2000 sq km, average depth 7–18 m or area larger than 2000 sq km but average depth less than 7 m or area less than 100 sq km but average depth more than 7 m) and small lakes (area less than 100 sq km, depth less than 7 m). Numerous stations observe precipitation, wind velocity, water stage, temperature of water in shore zone and waves (visual observation). In winter, ice formation, snow cover on ice, thickness of ice in shore zone and snow density are observed. Specialized lake stations also observe 15 other phenomena such as evaporation, tide phenomena, erosion of shore, etc. Some are described. The present number of lakes in the U.S.S.R. is around 270,000, of which 250,000 have an area of 0.01–1 sq km, 15,600 have a area of 1–20 sq km. A certain increase in the number of smallest lakes in U.S.S.R. is expected with the progress of detailed topographic surveys in Siberia. *Subject Headings:* **1. Hydrometeorological services 2. Lake classification 3. Lake surveys 4. U.S.S.R.**—*J.N.*

**12C–155** 551.526.84:551.481.1

Molchanov, I. V., **Zakonomernost' raspredeleniia temperatury vody po vertikali v teploaktivnom sloe presnykh ozer severnoĭ chasti umerennoĭ zony.** [Principles of the vertical water temperature distribution in the thermally active layer of fresh water lakes in the northern part of the temperate zone.] *Vsesoiuznyĭ Gidrologicheskiĭ S''ezd, Trudy* (Proceedings of the 3rd All Union Hydrological Conference, Oct. 1957), Vol. 4, issued **1959.** p. 210–220. 3 figs., 4 tables. **DWB** (M79 V985tr)—

The computation of vertical water temperature distribution in the active layer of lakes from average surface temperature is important for thermic balance of the lake. On the basis of statistically computed observation on the Molossovo Lake near Leningrad, a formula is presented for this purpose. Discussion of theoretical and practical value of the formulas and direction for calculation of its coefficients are given. *Subject Headings:* **1. Lake temperatures 2. Thermic balance of lakes 3. U.S.S.R.**—*J.N.*

**12C-156** 551.**526.8**:532.594(427.2)

†Mortimer, C. H., **Water movements in lakes during summer stratification; evidence from the distribution of temperature in Windermere.** *Royal Society of London, Philosophical Transactions, Ser. B*, 236(635):355-404, May 6, **1952.** 22 figs., 2 tables, 60 refs., 44 eqs. **DWB**—Author investigated oscillations of the boundary between two layers of different temperature in Lake Windermere (temperature seiches) during calm following wind, using a thermoelectric thermometer. Numerous vertical temperature sections are given. Analysis shows that the sharp boundary is replaced by an intermediate layer; internal waves in a 3-layer basin are examined theoretically and compared with observations in a model and in Lake Windermere. (*Same item as* 4.3-164, *Met. Abstracts.*) *Subject Headings:* **1. Lake temperature 2. Seiches 3. Lake Windermere, Eng.**—*C.E.P.B.*

**12C-157** 551.**556.8**:532.59

Mortimer, C. H. (*Freshwater Biological Assoc.*), **A model lake to illustrate water movements produced by wind.** *Irrigation and Power*, Delhi, 10(2/3):147, April/July **1953. DWB**—Tank experiment described by author consists of a long glass tank filled with water and arranged so wind could blow over the surface of the water and so solar heating could be simulated by hot wires in the surface layer (producing density stratification). Drag of surface waters, upwelling and internal waves can be observed by colored dyes as tracers. (*Same item as* 6.2-218, *Met. Abstracts.*) *Subject Headings:* **1. Lake models 2. Laboratory models 3. Wind stress on water 4. Wave mechanics.** —*M.R.*

**12C-158** 551.**526.8**:551.481.1

Mortimer, C. H., **Models of the flow-pattern in lakes.** *Weather*, London, 9(6):177-184, June **1954.** 5 figs., plate. **DWB**—Summer temperature stratification of deep lakes is described. It was first represented by a 2-layer model with water and phenol to represent epi- and hypolimnion separated by the thermocline. Wind-driven circulation is shown and compared with displacement and oscillations to the thermocline of natural lakes. An improved 3-layer model to include the thermocline layer was then constructed and the flow is shown in photos and diagrams. (*Same item as* 5.9-175, Sept. 1954, *Met. Abstracts.*) *Subject Headings:* **1. Lake temperatures 2. Lake circulation.** —*C.E.P.B.*

**12C-159** 551.**526.8**:551.481.1(436.3)

*Morton, Friedrich, **23 Jahre regelmässige Temperaturlotungen im Hallstättersee.** [25 years of regular temperature soundings in Hallstatter Lake.] *Austria. Zentralanstalt für Meteorologie und Geodynamik, Jahrbuch*, 1950, pub. **1951.** Abhang 4:D23-39, tables. **DWB**—Gives daily results of soundings from Oct. 1927 to Dec. 1950, by boat at surface and to a depth of 100 m in middle of lake. (*Same item as* 4.3-165, *Met. Abstracts.*) *Subject Headings:* **1. Lake temperatures 2. Hallstätter Lake, Austria.**—*C.E.P.B.*

**12C-160** 551.**509.58**:551.**556.8**:532.593:628.13

Moskal', V. P., **Proverka metoda rascheta povtoriaemosti vetrovykh voln po dannym nabliudeniĭ na Kakhovskom vodokhranilishche.** [Verification of the method of calculating the frequency of wind waves on the basis of observations for Kakhovka Reservoir.] *Vsesoiuznyĭ Gidrologicheskiĭ S''ezd, Trudy* (Proceedings of the 3rd All Union Hydrological Conference, Oct. 1957), Vol. 4, issued **1959.** p. 157-164. 2 figs., 2 tables. **DWB** (M79 V985tr)—Forecasting of frequency of waves of a certain height is performed on the basis of frequency of winds of a certain velocity. However, wind data available from period before building of large reservoirs can give misleading results since the new water surface changes the frequency of winds. Correction coefficients given by State Hydrological Institute apply only to rare frequencies. Observations on Kakhovka Reservoir permit computation of new coefficients, applying to all frequencies necessary for navigation planning purposes. *Subject Headings:* **1. Wave frequency forecasting 2. Kakhovka Reservoir, U.S.S.R.** —*J.N.*

**12C-161** 551.481.1:532.594(521.52)

Nakajima, T., **The seiche of Lake Suwa.** *Journal of Meteorological Research*, Tokyo, 7(3):183-184, March **1955.** 3 figs., tables, 3 refs. In Japanese; English summary p. 183. **DWB**—The author observed the seiche in the Lake Suwa from September 1952 to April 1953 by recording water gauge. The Lake Suwa is about 14 sq km in area and has an elliptic form with the major axis 5400 m, and the minor axis 3400 m, and the mean depth and the maximum depth are 4.4 and 7.0 m, respectively. The seiche periods are as follows: 1. longitudinal uninodal seiche ($T_1$) 22.4-min. period; 2. transversal uninodal seiche ($T_2$) 13.6-min. period; 3. transversal binodal seiche ($T_3$) 8.2-min. period and 4. plurinodal seiche ($T_4$) 4.0-min. period. *Subject Headings:* **1. Seiches 2. Lake Suwa, Japan.**—*Author's abstract.*

**12C–162** 551.481.1:551.579.4:551.588.4(285:797)

Nasburg, Edwin (*Hydraulic Eng. Bur. of Reclamation, Ephrata*), **Hydrologic aspects of the Soap Lake problem.** (In: Washington (State). State College, **Proceedings of the WSC Hydraulics Conference, Oct. 1957,** Pullman, Wash., pub. **1957.** p. 227–233. 2 figs.) **DWB**—The physiographic and geologic setting of Soap Lake is discussed. It is in a closed basin and is the southermost of a chain of lakes in the lower Grand Coulee of the old temporary bed of the Columbia River. Records show that during recent geologic times the Columbia was cut off by a mass of ice from the north, thus creating the lake which continued to be fed by an underground water system. The rise and fall of this lake affects the climate of the area. The 1953–1955 estimated monthly inflow has been tabulated in acre-feet based on the total inflow to the lake or basin, as well as on the precipitation of the area. An illustrative example of its effects on the irrigation system of the surrounding area is summarized. *Subject Headings:* **1. Lake hydrology 2. Soap Lake, Wash.**—*N.N.*

**12C–163** 551.481.1:551.579:551.573(498)

Neamtu, Victoria, **Lacul Căldăruşani: contribuţii la cunoaşterea regimului hidrologic.** [The Căldăruşani Lake: contributions to the knowledge of its hydrological regime.] *Meteorologia Hidrologia şi Gospodărirea Apelor,* Bucharest, 3(2/3):124–127, **1958.** fig. **DWB**—Morphological and hydrological characteristics of Căldăruşani Lake are briefly described. A diagram is presented showing monthly values (June–Oct. 1954, May–Nov. 1955 and May–Sept. 1956) of each element contributing to the water balance of the lake. These include precipitation data obtained with a raingage installed at the lake, and evaporation values obtained by direct measurement. (*Same item as* 10K–124, *Met. Abstracts.*) *Subject Headings:* **1. Lakes 2. Evaporation from lakes 3. Căldăruşani Lake, Romania.**—*G.T.*

**12C–164** 551.481.1:551.506.5(573)

Nekrasov, I. A., **Ekspeditsiia na ozero El'gytkhyn.** [Expedition to Lake El'gytkhyn.] *Problemy Severa,* Moscow, No. 1:360–370, **1958.** 6 figs., 6 refs. **DLC**—An air-borne exploratory expedition was sent in April–July 1955 to the Lake situated at 500 m altitude in the mountains of the Anadyr Plateau in east Siberia by the Anadyr station of the Permafrost Institute of the U.S.S.R. Academy of Science. The detailed report of the expedition chief contains information on the climate, weather characteristics, air temperature and snowfall data, archeological discoveries, coast line surveys, lake depth and water temperature measurements. In conclusion he discusses the probable origin of the round lake. *Subject Headings:* **1. Lake surveys 2. Lake El'gytkhyn, East Siberia.** —*A.M.P.*

**12C–165** 551.556.8:532.593:628.13(58)

Nikitin, I. K., **K voprosu o raschete vetrovogo i volnovogo rezhimov vodokhranilishch primenitel'no k usloviiam Sredneĭ Azii.** [The problem of calculating the wind and wave regimes of reservoirs under conditions in Central Asia.] *Vsesoiuznyĭ Gidrologicheskiĭ S''ezd, Trudy* (Proceedings of the 3rd All Union Hydrological Conference, Oct. 1957), Vol. 4, issued **1959.** p. 164–167. fig. **DWB** (M79 V985tr)—Building new reservoirs in Central Asia requires computation of the wave regime in order to provide the correct height for the dam's freeboard and the proper protection of the freeboard against wave scouring. The Experimental Institute for Irrigation has published a manual for this purpose based on laboratory experiments. Experiments on scouring protection were carried out with models; laws of similarity have been established. The experimental flume is 80 m long, its cross section is 4 by 4 m; artificial wind waves reach 1.5 m. *Subject Headings:* **1. Wave regime in reservoirs 2. Central Asiatic U.S.S.R.**—*J.N.*

**12C–166** 551.556.8:532.593:628.13(478)

Nikulin, P. I., **Vetro-volnovoĭ rezhim i pererabotka beregov Kuĭbyshevskogo vodokhranilishcha pri razlichnykh stadiiakh ego napolneniia.** [Wind and wave regime and changes in the shore line of Kuibyshev water reservoir during various stages of filling.] *Vsesoiuznyĭ Gidrologicheskiĭ S''ezd, Trudy* (Proceedings of the 3rd All Union Hydrological Conference, Oct. 1957), Vol. 4, issued **1959.** p. 140–150. 4 figs. **DWB** (M79 V985tr)—The Kuibyshev Reservoir was filled in 1955–57. In each period of filling, the wind-wave regime was observed. The reservoir can be divided into seven regions with specific hydrometeorological and geographical characteristics. Relations between wind speed and direction and wave height are given for some specific cases. The shore erosion resulting from wave activity is described and conclusions reached that the erosion depends also on other factors such as heavy rains, snow and spillway discharge of water. *Subject Headings:* **1. Shore line changes 2. Wind and wave regimes 3. Reservoirs 4. Kuibyshev Reservoir, Kuibyshev Region.**—*J.N.*

**12C-167** 551.**509.58**:551.326.85:627.17(7:285)
Oak, W. W. and Myers, H. Y. (*U. S. W. B., Detroit*), **Ice reporting on the Great Lakes.** *Weatherwise*, 6(1):7–10, Feb. **1953.** illus. **DWB**—General ice conditions of the Great Lakes are discussed. Maximum ice thickness measured at close of winter ranges from 17 to 41 in. at various places. Ice forms referred to in ice reports (hard blue ice, snow ice, honeycombed, slush ice, etc.) are defined. The ice reporting service, which is organized on a co-operative basis, is described. Data on opening dates and on preceding February's mean temperature are presented in tabular and graphical form. They were taken from studies of some 50 years of records conducted at the Detroit Weather Bureau Office. The data are used for determining the time when the lakes will become free for navigation. Errors involved in such predictions are evaluated. March 1 is found to be the date when the predictions can be made with sufficient accuracy. (*Same item as* 6.1–92, *Met. Abstracts.*) *Subject Headings:* **1. Ice forecasting 2. Lake ice 3. Great Lakes.**—*G.T.*

**12C-168** 551.**583.2**:551.481.1(43)
Oberdorfer, E., **Die postglaziale Klima-und Vegetationsgeschichte des Schluchsees (Schwarzwald).** [The post-glacial climatic and vegetation history of Schluch Lake (Black Forest).] *Naturforschende Gesellschaft, Bericht*, 31:1–86, **1931. DA**—The lake, including deposits below water level, was studied in detail. The water level was high in Atlantic but low in Boreal (−1.25 m) and sub-Boreal. The pre-Boreal is subdivided into cool and warm stages. The sub-Atlantic was characterized by sudden flooding. (*Same item as* G–154, July 1950, *Met. Abstracts.*) *Subject Headings:* **1. Climatic changes 2. Historical climates 3. Lakes 4. Schluch Lake, Germany.**

**12C-169** 551.**501.75**:551.**551.2**:628.13(584.6)
Ogneva, T. A., **O velichinakh koeffitsienta turbulentnosti nad vodoemami.** [Values of turbulence coefficient over reservoirs.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 69:51–56, **1957.** 3 tables, 7 refs., 8 eqs. **DLC**—The analytical method of the evaluation of the air turbulence coefficient above a water surface (spread over 10 to 100 km) is described, taking into consideration different processes of turbulent diffusion accompanying evaporation from a land or water surface. In the author's previous work (ref. 1), the preliminary data on probable values of this coefficient was computed according to a semi-empirical theory of turbulence and transformation of air masses. The method described involves the theoretical formulation of the changes of air masses moving from the surface of one level to another under the effect of differences in their temperatures, humidities and intensity of turbulent mixing. The error in computation appeared to be caused by nonuniformity in the temperatures. Humidities and other parameters are evaluated with given formulas. General analysis of the method and procedure is made with experimental data obtained by the Main Geophysical Observatory in 1955 for air transformation above Lake Balkhash, and assembled in tables. *Subject Headings:* **1. Reservoirs 2. Turbulence coefficient 3. Lake Balkhash, Kazakh S.S.R.**—*N.P.S.*

**12C-170** 551.**583.14**:551.481.1:576.8(435.1)
Ohle, Waldemar, **Der Vorgang rasanter Seenalterung in Holstein.** [The progress of shallowing with age of lakes in Holstein.] *Naturwissenschaften*, 40(5):153–162, March, **1953.** 9 figs., 66 refs. **DWB**—The decomposition of organic material on the lake bed depends on oxygen, temperature and bacterial activity. In the Gt. Plöner Lake there has been a marked decrease of $O_2$ and increase of $H_2S$ in recent years. The cause is partly increased surface temperature in spring leading to greater stagnation, but mainly an increase in the nitrogen and phosphorus compounds carried into the lake from surrounding fields, due to increased use of fertilizers and to increased rainfall. These have increased bacterial activity. (*Same item as* 4.8–233, *Met. Abstracts.*) *Subject Headings:* **1. Climatic trends 2. Lakes 3. Holstein, Germany.**—*C.E.P.B.*

**12C-171** 551.**556.8**:551.465:551.481.1(47)
Okhlopkova, A. N., **O dvukhsloĭnoĭ tsirkuliatsii vod v zalivakh Ladozhskogo ozera.** [Two-layered circulation of water in the bays of Lake Ladoga.] *Akademiia Nauk SSSR, Doklady*, 129(2):397–400, **1959.** 3 figs., table, ref. **DLC**—The author presents the results of observations on currents in the inlets of the northwestern part of Lake Ladoga in order to clarify the conditions of water exchange between narrow inlets deeply incised in the mainland and the main body of water. Winds arising in the bays produce drift currents which in turn cause a rise in level at the shores resulting in a counter current, i.e., a two-layered water circulation. Winds with easterly components are on-shore winds and winds with westerly components are off-shore winds. The compensation

current is smaller in the case of off-shore than in that of on-shore winds. During summer the depth of penetration of the drift current depends on the position of the temperature jump layer and on the wind velocity. The velocity of the surface current was found to depend upon the wind velocity for three ranges of depth at the point of observation. This dependence is parabolic; in regions of little depth the velocity of the surface current is considerably less than in areas of great depth for the same wind velocity. Furthermore, a study of the angle of deviation of the surface current from the wind direction shows that the greater the wind velocity the greater is the angle of deviation. *Subject Headings:* **1. Water circulation in large lakes 2. Lake circulation 3. Lake Ladoga, European U.S.S.R.**—*I.L.D.*

**12C–172** 551.462:551.351.3(57)

*†Patrikeeva, G. I., **Donnye otlozheniia Malogo Moria.** [Bottom deposits in Maloe More.] *Akademiia Nauk SSSR. Vostochno-Sibirskiĭ Filial, Irkutsk, Trudy Baikal'skoĭ Limnologicheskoĭ Stantsii*, Vol. 17:205–254, **1959.** 24 figs. (2 fold.), 31 tables, 53 refs. **DWB** (551.48 A313is)—Bottom sediments are the important elements in the general characteristics of a water reservoir. Processes in their formation and distribution of their components have direct bearing on the movements of water masses, on regularities in development of bottom life and on many other phenomena. The history of previous investigations of sediments is briefly reviewed with descriptions of the methods and equipment used in water sampling and in the chemical analyses of various ingredients. The review also includes a brief physico-geographic characterization of Maloe More (Little Sea) and probable means for delivery of the sediment materials. This outline is graphically illustrated with two large maps: one with isolines for different depths and with marked locations of various observation stations and another with marked distribution of the sediments of different types (shore silt, diatomic silt, siltstone, fine sand, coarse sand, pebbles, gravel, rocks and boulders). The sediments are classified into two groups: complex (granulometric, chemico-mineralogical, terrigenous) and hydrodynamic (containing the fractions less than 0.01 mm). The major types of sediment are shown in photographs and their characteristics are listed in tables. The schematic profiles of vertical and horizontal distribution of the sediments are shown on seven cross sections of the sea and geological characteristics are described in the text. Attention is given to the nearest geological period with ample sedimentation of the terrigenous materials, indicating the stratigraphic thickness of the coarse siltstones laid between horizontal layers of sand and repeated and siltstones of the argillaceous materials. The lower layers are composed of this siltstone mixed with the diatomic one. The more recent layers contain numerous pollen of pine, larch, cedar and spruce. The distribution of separate components of the bottom sediment (terrigenous materials, authigenic silica, organic carbon, iron, manganese, phosphorus, etc.) are described in the text, illustrated on seven maps of the Maloe More (Little Sea) and listed in tables. The main significance of more recent sedimentation processes, acting comparatively fast, is summarized in the conclusion with the emphasis on the biogenic factors, hydrochemical conditions under water and distribution of major components in the sediments. *Subject Headings:* **1. Bottom sediments 2. Reservoirs 3. Maloe More, Siberia.**—*N.P.S.*

**12C–173** 551.579:551.48(497.2)

Penchev, P., **Gidrologicheskie issledovaniia v Bolgarii.** [Hydrological investigations in Bulgaria.] *Vsesoiuznoe Geograficheskoe Obshchestvo, Leningrad, Izvestiia*, 88(2):147–154, March/April **1956.** **DLC**—The significance of hydrologic studies in the economy of Bulgaria is discussed and the investigations carried out in this field since the end of World War II are described. A summary is given of the investigations of underground waters and rivers, of limnologic studies, and of the limnologic and oceanographic studies on the Bulgarian coast of the Black Sea. The fundamental problems to be investigated are listed, namely: the underground water balance of Bulgaria, the genetic elements of river flow and the regime of inland waters. (*Same item as* 8.10–251, *Met. Abstracts.*) *Subject Headings:* **1. Hydrologic studies 2. Underground water 3. Limnological investigations 4. Bulgaria.**—*I.L.D.*

**12C–174** **551.578.46:551.524.3:551.553.11**

Peppler, W., **Seebrisenähnliche Winde bei Schneedecke am Bodensee im März 1931.** [Seabreeze-like winds with snow cover at Lake Constance in March 1931.] *Zeitschrift für Angewandte Meteorologie*, 49(4):117–121, April **1932.** 2 tables. **DLC**—In March, 1931 heavy snow fell in southern Germany, creating a deep snow cover at a date when the solar angle is comparatively high. Two remarkable phenomena were observed near Lake Constance on this occasion: a diurnal air temperature variation up to 17° in amplitude and the occurrence of lake breezes. Data on wind conditions at several stations near Lake Constance are tabulated for the days March 13 17, 1931. The remarkable temperature range, involving maximum temperatures up to 8°C over the snow cover, is tentatively attributed to atmospheric absorption of direct and reflected solar radiation, which would require an extremely high absorption coefficient of clear air. (*Same item as* 2G–157 and 7G 59, *Met. Abstracts.*) *Subject Headings:* **1. Microclimatic effects of snow cover 2. Lake breezes 3. Temperatures over snow surface 4. Lake Constance, Germany.**—*G.T.*

12C–175 551.511:551.481.1(7:285)

Petterssen, Sverre (*Weather Forecasting Research Center, Chic. Univ.*), **Some weather influences due to warming of the air by the Great Lakes in winter.** *Conference on Great Lakes Research, 3rd, Ann Arbor, Mich., May 6–7, 1959, Proceedings*, pub. **1960.** 6 figs., 7 refs., 10 eqs. **DWB** (M82/779 C748pr)—It appears to be beyond doubt that heat transfer from the Lakes to the air exerts a modifying influence on the motion systems and a dominating influence on the weather systems. This has been a preliminary survey of the effects of the Great Lakes on the pressure configurations and the patterns of precipitation in the vicinity of the Great Lakes during a cold spell. An attempt has been made to isolate the effects which are due to the transfer of heat from the water to the air during typical winter conditions. The investigation has been conducted as a pilot project, and is based entirely on routine observations. *Subject Headings:* **1. Heat transfer from lakes 3. Precipitation patterns 4. Lake effects on weather 5. Great Lakes.**—*E.Z.S.*

12C–176 551.573:551.579(7:285)

*†Pettis, C. R. and Hickman, Harold C., **Hydrology of the Great Lakes. A symposium.** *American Society of Civil Engineers, Transactions*, 105:794–849, **1940.** 12 figs., 9 tables, 37 refs., 5 eqs. **DLC**—1) Typical quantitative analysis as applied to Lake Superior, by Pettis. By means of deductions made from available data values are obtained for evaporation from the lake surface. Underground flow to lake and land losses are then computed. 2) Evaporation experiments, by Hickman. Extensive experiments conducted in pans at points on Great Lakes' shores. Readings analyzed and plotted on two charts from which estimate of monthly or daily evaporation from Great Lakes can be made. (*Same item as* K–101, Oct. 1950, *Met. Abstracts.*) *Subject Headings:* **1. Evaporation from lake surfaces 2. Hydrology symposium 3. Great Lakes.**

12C–177 551.46.01

Picotti, Mario, **Nouveaux types de bouteilles à eau en verre et leur emploi en océanographie en limnologie et en bactériologie.** [New types of glass water bottles and their use in oceanography limnology and bacteriology.] *Trieste. Istituto Sperimentale Talassografico, Pubblicazioni*, No. 351 **1958.** 9 p. 3 figs., 16 refs. French and English summaries p. 8-9. **DWB, DLC**—The chemica reactions employed today in colorimetry and spectrophotometry are so sensitive that the determination of oligodynamic elements in sea water as well as in fresh water is now possible. Such determinations are very important from the viewpoint of biology and therefore the research in this field is widely increasing. The use of metallic bottles for the collection of water samples for the determination of oligodynamic elements, presents a serious inconvenience, because the water may very easily be polluted by contact with metal. For this reason the author has substituted the metal with glass and has made a cylindric bottle which, after being emptied of air, is lowered to the desired depth by means of a suitable support. The filling of the bottle is produced by an ordinary messenger For the collection of water samples near the sea floor and up to 1 m from it, a giant bottle has been constructed by which it is possible to collect 10 samples at a distance of 10 cm from each other *Subject Headings:* **1. Oceanographic instruments 2. Limnological instruments.**—*Author's abstract.*

12C–178 551.326.85:551.322:627.1

†*Pictrovich, Vil'gel'm Vladislavovich, **Obrazovanie i staivanie l'da na ozerakhvodokhranilishchakh i raschet srokov ledostava i ochishcheniia.** [Formation and melting of ice in lake-reservoirs and computation of freezing and clearing dates.] Moscow, Gidrometeoizdat, **1958.** 191 p. 39 figs., 45 tables, 33 refs., 26 eqs. At heat of title: Glavnoe Upravlenie Gidrometeorologichesko Sluzhby pri Sovete Ministrov SSR, Tsentral'nyĭ Institut Prognozov. **DWB** (551.311 P662ob)—The methods and results of theoretical investigations carried out in 1952–1954 at the Central Institute of Forecasting for the purpose of working out methods of computating the mean dates o formation and melting of ice in lake reservoirs are presented and discussed. They include: 1) studies of the water cooling in lakes and reservoirs in autumn and formulas for its computation; 2) formulas for calculating the heat exchange of the water surface and ice cover; 3) computation of the influence of the reservoir on air temperature, humidity, wind velocity, etc. Some practical results of investigations of autumn cooling of water and spring thawing of ice in a number of reservoirs are included. *Subject Headings:* **1. Freezing of reservoirs 2. Ice formation computation.**—*A.M.P.*

12C–179 551.526.8:577.3(436.14)

†Pleskot, Gertrud, **Wassertemperatur und Leben im Bach. (Limnologische Studien in der Gebieten der Lunzer Seen und des Wienerwaldes.)** [Water temperature and life in a stream (Limnological studies in the region of the Lunz lakes and the Vienna forest).] *Wetter und Leben* Vienna, 3(5-7):129–143, June **1951.** fig., 2 tables, 24 refs. **DLC**—A survey of the temperature

of a number of streams in relation to the distribution of various water plants and insects. (*Same item as* 3.2-113, Feb. 1952, *Met. Abstracts.*) *Subject Headings:* **1. Water temperatures 2. Lakes and rivers 3. Limnology 4. Vienna, Austria.**—*C.E.P.B.*

**12C–180** 551.481:535.24(45)

Polli, Silvio, **I laghi Ghiacciato e Rotondo del Mandrone (Adamello).** [Lakes Ghiacciato and Rotondo of the Mandrone group (Adamello).] *Istituto Talassografico,* Trieste, Publ. No. 272, **1951.** 16 p. figs., 2 tables, 3 refs. Also his: **Ricerche fotometriche subacque nel lago Scuro (Adamello).** [Photometric research under water in Lake Scuro (Adamello).] *Ibid.,* Publ. No. 276, **1951.** 11 p. 3 figs., 4 tables, 3 refs. **DWB**—Reports on photometric investigation of light penetration made in the mountain lakes of Monte Adamello (Rhaetian Alps, Northern Italy) under sponsorship of the Centro di Studi Alpini and Centro di Studi Talassografici. The lakes are described as to their geographic location, their size and shape, and their morphological, physical and hydrographic properties. Sections and photographs are presented. The equipment used in the photometric studies is described in detail and the results obtained regarding transparency, and light penetration tabulated and shown in graphs. Various colors and diffuse light are accounted for. Values obtained in a measurement of heat penetration are also presented. The measurements were made in Sept. 1949 and July 1950. *Subject Headings:* **1. Light transmission of water 2. Lakes 3. Photometric measurements 4. Monte Adamello, Italy.**—*G.T.*

**12C–181** 551.481.1:551.324.86

*Polli, Silvio, **Il lago nuovo al ghiacciaio del mandrone (Adamello).** [New glacial lake of Mandrone (Adamello).] *Trieste. Istituto Sperimentale Talassografico, Publicazioni,* No. 314, **1955.** 18 p. 8 figs. (incl. photos.), 5 tables, 14 refs. **DLC**—Optical and thermal properties of the newly formed (1950) glacial lake of Mandrone (Adamello) are discussed, data presented and photos of the Lake and Glacier in 1951 and 1952 from various points of view included. Data on the regression of the glacier are also presented. Color of the lake, turbidity data, level of the lake, coefficients of extinction to 50 cm (1950–1953) in various spectral regions, and ratio of penetration of direct to diffuse light are given in tables and discussed. *Subject Headings:* **1. Limnology 2. Glacial lakes 3. Monte Adamello, Italy 4. Mandrone Glacier, Italy.**—*M.R.*

**12C–182** 551.465:532.594(262)

Polli, Silvio, **Le sesse (seiches) dell'Adriatico.** [Seiches of the Adriatic.] *Associazione Geofisica Italiana, 7th Rome, Nov. 1957, Atti,* pub. Rome, (1958?). p. 87–94. 3 figs., 3 tables, 14 refs., eq. Italian and English summaries p. 93.—The difference between observed and calculated tides at Trieste are determined from tide curves. This differential curve is basically composed of seiches in the Adriatic. VERCELLI's periodic analysis is applied and the seiches found to occur at approximately 21:33, 12:19, 7:57 and 4:20 (mean time). *Subject Headings:* **1. Seiches in Adriatic 2. Trieste.** —*M.R.*

**12C–183** 551.573:551.481.1

Poppendiek, Heinz F. and Tribus, Myron, **A comparison of several heat and mass transfer networks of interest in water conservation.** *American Geophysical Union, Transactions,* 32(1):49-56, **Feb. 1951.** 9 figs., 16 refs., 10 eqs. **DLC, DWB**—Based on previous works of various authors, several electrical networks for heat and mass flow in an open earth field system, a snowbank system, a lake network and a network of U. S. Weather Bureau Evaporation Pans are proposed and the necessary instrumentation discussed and illustrated. Theoretical aspects are also treated and the relation between resistances for convection and evaporation measurements worked out graphically and discussed. Purpose of experiments would be to predict evaporation from lakes and reservoirs. (*Same item as* 2.11-131, Nov. 1951, *Met. Abstracts.*) *Subject Headings:* **1. Evaporation forecasting 2. Energy exchange 3. Lakes and reservoirs 4. Water supply.**—*M.R.*

**12C–184** 525.623:551.465(98/99)

Ratser, Ivanova, F. S., **Opredelenie periodov svobodnykh kolebaniĭ sutochnogo i polusutochnogo tipov v poliarnykh moriakh.** [Determination of the period of free oscillation of the diurnal and semidiurnal types in polar seas.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.,* No. 2:254 261, Feb. **1959.** 5 figs., 5 tables, 4 refs., 9 eqs. **DLC**—The author presents a method of computing the free oscillations of tidal type in polar seas bounded by circles of latitude. By means of equations the author analyses the oscillation of a heavy incompressible fluid of constant thickness under conditions where internal friction and bottom friction are neglected, horizontal velocity is independent of depth and vertical mixing and velocity are slight in comparison to the horizontal. An equation determining the form of the surface of the fluid is derived. The sea is examined in the form of a polar cap bounded by a circle of latitude $\theta = \theta_0 (\mu = \mu_1)$ and formulas are derived for mass computation of periodic oscillations of polar seas of different dimensions and different depths for periods less than half a day.

Equations are derived for diurnal periods and for computing periods for different depths and dimensions of polar seas bounded by circles of latitudes. Tables giving data in free oscillations of diurnal type in polar seas bounded by latitude $\varphi_0 = 60^\circ$ ($\tau < 12$ hours), periods of free oscillation of diurnal type in a polar sea bounded by parallel $\varphi_0 = 30^\circ$ ($\tau < 12$ hours), etc., and graphs showing the dependence of periods of free oscillation of the daily type in polar seas limited by parallel $\phi = 60^\circ$ upon depth, etc., are presented. *Subject Headings:* **1. Tides 2. Polar tides 3. Tides in polar seas.**—*I.L.D.*

**12C-185** 551.481.1

†Rawson, D. S. (*Univ. of Saskatchewan*), **Limnology in the North American Arctic and Subarctic.** *Arctic,* Montreal, 7(3/4):206–212, **1954.** 27 refs. **DLC**—The author discusses the number and extent of lakes in the North American Arctic, ice and temperature conditions, water circulation in these Arctic lakes and their ecological characteristics. *Subject Headings:* **1. Limnology 2. Arctic.** —*I.L.D.*

**12C-186** 551.579 551.481

Renqvist, Henrik, **Suomen sisävedet.** [Inland waters of Finland.] *Finland. Hydrografiska Byrån, Hydrografisen Toimiston Tiedonantoja, Meddelanden,* 13:145–180, **1951.** 22 figs., 6 tables, 6 refs. Abstracted from reprint. **DWB**—A nicely edited study of the characteristics of inland waters (lakes and rivers) in Finland, based on records obtained in many parts of the country. Data are analyzed by regions or watersheds and presented in tables and charts, as well as being interpreted by means of analytical graphs, showing variations with time and other factors. (*Same item as* 4.1–202, *Met. Abstracts.*) *Subject Headings:* **1. Hydrology 2. Limnology 3. Finland.**—*M.R.*

**12C-187** 551.501.724:551.526.8:627.1(571)

Rossinskiĭ, K. I., **Temperaturnyĭ rezhim glubokikh vodoemov.** [Temperature regime of deep reservoirs.] *Vsesoiuznyĭ Gidrologicheskiĭ S''ezd, Trudy* (Proceedings of the 3rd All Union Hydrological Conference, Oct. 1957), Vol. 4, issued **1959.** p. 220–228. 2 figs., 3 refs., 5 eqs. **DWB** (M79 V985tr)—Several new dams in U.S.S.R. have reservoirs deeper than 100 m. The thermal regime of such reservoirs has not yet been examined. Based on observation of the Teletskoye Lake, a method is proposed for computation of winter temperature of such reservoirs. The method consists in a consecutive five day thermic exchange balance. A step-by-step integration of a partial differential equation leads to the calculation of surface and average depth temperature. *Subject Headings:* **1. Reservoir temperatures 2. Lake Teletskoye, Altai Territory.**—*J.N.*

**12C-188** 551.526.8:551.481.1(572)

†*Rossolimo, L. L., **Temperaturnyĭ rezhim ozera Baĭkal.** [Temperature regime of Lake Baikal.] *Akademiia Nauk SSSR. Baĭkal'skaia Limnologicheskaia Stantsiia, Trudy,* Vol. 16, **1957.** 551 p. 313 figs., 119 tables, 47 refs. At head of t-p: Akademiia Nauk SSSR. Vostochno-Sibirskiĭ Filial. **DWB** (N26.8 R838te), **DLC** (DK771.B3A18)—A huge book containing a compilation of all available data on the temperature of different parts of Lake Baikal down to 300 m during the ice season, spring, summer and autumn, with hundreds of cross sections or profiles, tables of data and examples of unusual, as well as mean conditions in the open lake and in shore or bay sectors taken individually. Time sequences, year-to-year variations, effect of ice cover, etc are given. A previous work by L. F. FORSH on surface temperatures of Lake Baikal was published by the Baikal Limnological station in its *Trudy,* No. 15, **1957,** with data for 1896–1945 included in the analysis. A history of studies and observations on temperature of Lake Baikal is found on p. 9–27, and methods set forth in the following pages. (*Same type as* 10.7–33, *Met. Abstracts.*) *Subject Headings:* **1. Temperature, Lake Baikal 2. Lake temperature surveys 3. Limnology 4. Lake Baikal, Siberia.**—*M.R.*

**12C-189** 551.526.64:551.468

*Rossolimo, L. L., **Nekotorye cherty temperaturnogo rezhima Malogo Moria.** [Certain characteristics of the thermal regime of Maloe More.] *Akademiia Nauk SSSR. Vostochno-Sibirskiĭ Filial, Irkutsk, Trudy Baikal'skoĭ Limnologicheskoĭ Stantsii,* Vol. 17:7–33, **1959.** 20 figs., 11 tables, 3 refs. **DWB** (551.48 A313is)—The studies of the water temperature variations in the Maloe More (Little Sea), representing the central portion of Lake Baikal, have been made since 1934 by the expedition of the Biological-Geographical Institute of the Irkutsk University and also by the author between 1951–56. The observations of water temperature were carried out at different depths along the five cross sections and also lengthwise of Maloe More at various periods of year from Feb. to the end of Nov. under four thermal conditions (ice, spring thawing, summer heating and autumn cooling). The recorded temperatures were plotted for each cross section and lengthwise of the sea. The points of the same temperature were connected by the isolines for indication of the temperature distribution under water. The analysis of the results and discussion are presented in the conclusion. *Subject Headings:* **1. Temperatures of Maloe More, Siberia 2. U.S.S.R.**—*N.P.S.*

12C–190 551.573:551.579.4:551.577

†Royal Geographical Society of Australasia. South Australian Branch. Lake Eyre Committee, **Lake Eyre, South Australia: the great flooding of 1949–50. Report of the Lake Eyre Committee.** Adelaide, South Australia, Griffin Press, **1955.** 75 p. tables, plates, refs., figs. throughout, map (fold.) at end. **DLC**—Contents: Price, A. Grenfell, **Introduction and Historical geography,** p. ix–xi, 1–5. Bonython, C. Warren, **Geography of Lake Eyre and its surroundings,** p. 7–9. Mason, B., **Rainfall in the Lake Eyre Catchment,** p. 11–26. Bonython, C. Warren, **The filling and drying-up,** p. 27–36. Bonython, C. Warren, **Evaporation rate,** p. 37–56. Penman, H. L., **Evaporation from Lake Eyre,** p. 57–61. Bonython, C. Warren: **Area, volume and salt content,** p. 63–68. Bonython, C. Warren, **Depression of Lake Eyre below sea level,** p. 69–70. **Flora, fauna and minerals from Lake Eyre and surroundings,** p. 71–75.—Discovery (1840), exploration and geography are described. The mean rainfall is 10–17″ in the catchment area, 5″ around lake, average 1880–1948 in the catchment 11.4″. 1949 (27.58″) and 1950 (28.89″) exceeded all previous records, but probably water flowed into the lake several times in last 100 years. It was full in Sept. 1950, began to fall in Oct., was practically dry by Jan. 1953, but flooded again in April. BONYTHON made detailed meteorological observations on the lake in May and Sept. 1951 and calculated evaporation rate in 1951 as 76.8″ (Dec. 11.1, June 1.2); somewhat higher values are given by PENMEN. BONYTHON also discusses area (3100 sq mi at maximum), volume (17 million ac-ft) and salinity (NaCl 71 f/1 on Feb. 11, 1951, increasing to saturation (320 f/1 by Jan. 1952). (*Same item as* 7.4–4, April, 1956, *Met. Abstracts.*) *Subject Headings:* **1. Lake level fluctuations 2. Excessive rainfall 3. Evaporation 4. Lake Eyre, Australia.**—*C.E.P.B.*

12C–191 551.583.3:551.481.1

Russell, Israel C., **Geological history of Lake Lahontan, a Quaternary lake of north-western Nevada.** *U. S. Geological Survey, Monograph,* No. 11, Washington, D. C., **1885.** 288 p. **DLC**—Describes the double rise and fall of a large Quaternary lake in the northwest of the Great Basin, now represented only by a few small brackish lakes. (*Same item as* G–57, July 1950, *Met. Abstracts.*) *Subject Headings:* **1. Climatic changes 2. Quaternary climates 3. Lakes 4. Great Basin.**

12C–192 551.48:536.6(57)

*Rymsha, V. A. and Donchenko, R. V., **Issledovanie teplopİter' s otkrytoĭ vodnoĭ povernosti v zimnee vremia.** [Investigation of heat losses from an open water surface in winter.] *Leningrad. Gosudarstvennyĭ Gidrologicheskiĭ Institut, Trudy,* No. 65:54–83, **1958.** 10 figs., 13 tables, 19 refs., 25 eqs. **DWB**—Thermal conditions in the rivers, lakes and water reservoirs are discussed in relation to heat exchanges between atmosphere, water and under water ground affecting the conditions for ice formation. Various empirical formulas, developed on the basis of experimental data are used for computation of major components of heat balances (convection, evaporation and radiation). The results of various methods used in determination of heat exchanges are reviewed and coordinated with the effects of various parameters for the interpretation of discrepancies in final results. Emphasis is laid on variation of calculated results due to summer and winter conditions. The methods of various investigations are reviewed with description (and illustration) of the calorimeter and details of its arrangements, processes of observation and evaluation of results obtained at various rivers (Irtysh), Yenisei, Chu, Buoksa and Angara) and at the Zelengorsk Experimental Station with consideration of various meteorological conditions. Comparative analysis of tabulated data is illustrated by the graphs. *Subject Headings:* **1. Heat loss from water surfaces 2. Calorimeters 3. U.S.S.R.**—*N.P.S.*

12C–193 535:551.463 551.526.8:551.481.1(52)

Sasaki, Tadayoshi; Okami, Noboru; Watanabe, Seeichi and Oshiba, Gohachiro, **On the vertical distributions of the intensity of illumination in the water and water temperature of Lake Ashinoko.** *Records of Oceanographic Works in Japan,* Tokyo, n.s., 2(1):57–70, March **1955.** 12 figs., 8 tables, 2 refs. **DWB**—A water-tight illuminometer with high sensitivity, and a thermistor thermometer (both constructed in Tokyo laboratory) were used to obtain vertical distribution of intensity of submarine illumination and water temperature in Lake Ashinoko, Hakone. Apparatus are described and illustrated in detail. The chart of the lake shows lines of equal intensity of transparency and location of stations in lake. The relation between water temperature, cloud, wind force, altitude of sun, wave length, plankton and extinction coefficient or illumination at different depths are tabulated and shown graphically and on charts for various parts of the lake. (*Same item as* 8.6–240, *Met. Abstracts.*) *Subject Headings:* **1. Submarine illumination 2. Lake temperatures 3. Lake Ashinoko, Japan.**—*M.R.*

12C–194 551.521:551.481.1

†Sauberer, Franz and Ruttner, Franz, **Die Strahlungsverhältnisse der Binnengewässer.** [Radiation conditions of inland waters.] Leipzig, Becker and Erler, **1949.** 240 p. 73 figs., 59 tables, refs.

(p. 213–224), 30 equations. (*Probleme der Kosmischen Physik*, Vol. 21.) **DLC**—A thorough and systematic treatment of all phases of radiation (of various wave lengths), absorption, reflection, penetration and biologic effects thereof, in connection with inland lakes and seas. Includes theoretical, instrumental and practical aspects, as well as a large amount of summarized observational data and many schematic diagrams. The bibliography is most extensive and is grouped according to subjects. (*Same item as* 10–80, Oct. 1950, *Met. Abstracts.*) *Subject Headings:* **1. Radiation 2. Lakes.**—*M.R.*

**12C–195** 551.481.1:535.24

Sauberer, Franz, **Über das Licht im Neusiedlersee.** [Light in Neusiedler Lake.] *Wetter und Leben*, 4(1/2):12–15, Feb. **1952.** 3 tables. **DLC**—Light measurements were made on four different days between April and Sept. 1951 in the Neusiedler Lake. Data on the transmission of wave lengths ranging from 400 to 700 $m\mu$ for depths from 10 cm to 1 m during moderate wind, during severe northwest wind and in water colored by humus matter. A comparison is made with visibility in Lunz Lake and the ecological significance of changes in visibility with turbidity and depth are discussed. *Subject Headings:* **1. Light transmission of water 2. Lakes 3. Neusiedler Lake, Austria.**—*I.L.D.*

**12C–196** 551.521:551.481.1(436)

Sauberer, Franz, **Der Strahlungshaushalt eines alpinen Sees.** [The radiation balance of an Alpine lake.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 4(3):253–274, **1953.** 5 figs., 14 tables, 22 refs. German, English, French summaries p. 253–254. **DLC**—The lower Lunz Lake (47°51′N, 15°3′E, area 67.8 ha) lies in a deep valley surrounded by mountains averaging 17° elevation. From maps of possible sunshine duration, daily sum of solar radiation is calculated for each month, taking account of cloudiness. Annual global radiation is made up of 50,500 cal/$cm^2$ solar and 39,200 sky radiation. Total effective radiation takes account of reflection from water surface (6% June 21, 19% Dec. 22) and of winter ice cover. Back radiation from atmosphere is calculated from temperature and vapor pressure by formula of Bolz and Falckenberg. Finally, outward radiation from water surface leads to estimates of long-wave and total radiation balance in each month, which give an annual total of about 40,000 cal/$cm^2$ compared with 30,000 for Lake Sakrow (Albrecht). (*Same item as* 4.8-113, *Met. Abstracts.*) *Subject Headings:* **1. Radiation balance of lakes 2. Lake Lunz, Austria.**—*C.E.P.B.*

**12C–197** 551.586:551.481.2

Sauberer, Franz, **Die Rolle der Bioklimatologie bei der Erforschung unserer Fliessgewässer.** [The role of bioclimatology in the investigations of our streams.] *Wetter und Leben*, Vienna, Sonderheft, No. 2:48–51, Sept. **1953.** **DLC**—Air pressure, wind, evaporation, radiative balance, temperature variations, precipitation and other meteorological factors affect the physical environment of biological forms inhabiting streams. General remarks contained in this paper elaborate this theme. (*Same item as* 6.2-311, *Met. Abstracts.*) *Subject Headings:* **1. Stream bioclimatology 2. Limnological research.**—*M.R.*

**12C–198** 551.556.8:551.481.1(436)

Sauberer, Franz, **Der Wind-Einfluss auf die Trübung des Neusiedlersees.** [Wind influence on the turbidity of Neusiedler Lake.] *Wetter und Leben*, Vienna, 5(11/12):200–203, Dec. **1953.** 3 figs. **DLC**—The influence of wind upon the transparency of the water of Neusiedler Lake is investigated on the basis of a three years' record of wind data, including distribution of wind frequency, intensity and water transparency measurements made twice daily since April 1, 1952. The author presents curves showing the diminution of transparency with wind direction; lengthwise winds caused greater turbidity than cross-winds. (*Same item as* 6.2–220, *Met. Abstracts.*) *Subject Headings:* **1. Wind effects on lake turbidity 2. Lake turbidity 3. Neusiedler Lake, Austria.**—*I.L.D.*

**12C–199** 551.511.33:551.526.8

Saur, J. F. T. and Anderson, E. R. (*both, U. S. Navy Electronics Lab., San Diego, Calif.*), **Heat budget of a body of water of varying volume.** *Limnology and Oceanography*, Baltimore, Md., 1(4):247–251, Oct. **1956.** fig., 10 eqs. **DLC**—When the heat budget is applied to determine the evaporation from a lake of varying volume, the water budget must be considered. Using the continuity of the system, a modified equation for evaporation from the heat budget has been developed. The modified equation has a term in the denominator that includes a base temperature used in the calculations. This equation is flexible in use and permits minimizing errors due to unknown quantities in the water budget. (*Same item as* 104.–222, *Met. Abstracts.*) *Subject Headings:* **1. Heat balance of lakes 2. Lake circulation.**—*Authors' abstract.*

**12C-200** 551.579:551.48(44)

Schachter, D., **Contribution à l'étude hydrographique et hydrologique de l'étang de Berre, Bouches-du-Rhône.** [Contribution to the hydrographic and hydrologic study of Berre Lagoon at the mouth of the Rhone.] *Institut Océanographique, Monacò, Bulletin*, 51(1048), Aug. 31, **1954.** 20 p. 6 diagrs. (fold.), tables, refs. p. 12–13. Price: 160 fr. **DWB**—Data for March 1952 to Feb. 1953 obtained at Berre Lagoon in the Rhône Delta are analyzed and presented in graphs and tables. Monthly precipitation and evaporation are presented on the same histograms; daily pressure, wind, air, sea and water temperature, precipitation and evaporation on single extended chart. In addition, chemical analyses of the water in the Lagoon are presented for ecological studies of the fauna. (*Same item as* 7.8-216, *Met. Abstracts.*) *Subject Headings:* **1. Micrometeorological data 2. Ecological studies 3. Limnology 4. Berre Lagoon, France.**—*M.R.*

**12C-201** 551.579:551.481.1

Schellenberger, Günter, **Betrachtungen zur seeretention.** [Notes on lake retention.] *Acta Hydrophysica*, Berlin, 6(2):65–72, **1960.** fig., 4 refs., 10 eqs. German summary p. 65. **DLC**—The continuity equation for a linear discharge curve is integrated and proved. The solution for the damping and phase changes is in satisfactory agreement with the experimental results. *Subject Heading:* **1. Lake discharge curves.**—*E.Z.S.*

**12C-202** 551.46.018:551.465

*†Schering, W. (*Forschungsanstalt für Schiffahrt, Wasser- und Grundbau, Berlin*), **Bestimmung des Beiwertes $\mu$ für scharfkantige Überfälle durch Ermittlung senkrechter Geschwindigkeitsprofile.** [Determination of the coefficient $\mu$ for overflow over sharp edges from vertical velocity profiles.] *Acta Hydrophysica*, Berlin, 5(3):107–151, **1959.** 28 figs., 15 tables, 21 refs., 10 eqs. German. summary p. 107. **DLC**—Hitherto the measurements of the overflow coefficient $\mu$ were carried and by weighing the quantity of water that had flown over a dam. In this study the author investigates the exactness with which $\mu$ can be determined from velocity profiles by using the experimental conditions recommended by REHBOCK. With the aid of diagrams and photographs the author describes the experimental procedure and the measuring instruments. The measurements of the velocity profiles, the evaluation of measurements, the computation of errors, the computation of $\mu$ value according to the Lauck method including the difficulties of exact computation attempt at an approximate computation consideration of inflow velocity, second approximation of overflow height, etc. The approximation of the $\mu$ value according to the Lauck method for the relation $H/W$ is given as 0.5. Tables giving function values of the declevity course for different values of $H/W$ ($W$ = dam height and $H$ = overflow height), perpendicular velocity distribution for different values of $W$ and $H$, $\mu$ = values measured according to REHBOCK and by the author, etc. *Subject Heading:* **1. Overflow coefficient.**—*I.L.D.*

**12C-203** 551.481.1(661)

†Schiffers, Heinrich, **Die Seen in der Sahara.** [The lakes in the Sahara.] *Erde*, 1:1–13, **1951 52.** 5 figs., fold. chart, table, 29 refs. **DLC**—Descriptions and maps of the Saharan lakes and their extent in the Pluvial period, the source of the water, its salinity and a few temperatures, and movements of dunes. *Subject Headings:* **1. Lakes 2. Sahara Desert.**—*C.E.P.B.*

**12C-204** 551.521.3:551.481.1

Schmitz, Hans Peter, **Über die Erwärmung von Binnenseen.** [On the warming of inland seas.] *Zeitschrift für Meteorologie*, 6(2):48–53, Feb. **1952.** 48 eqs., 9 refs. **DLC**—The effect of absorption of radiation in a deep column of water is examined mathematically, taking account of changing vertical distribution of pressure due to warming by day and surface cooling by night. A complex solution is obtained but is not applied practically. *Subject Headings:* **1. Radiation storage 2. Lakes.** —*C.E.P.B.*

**12C-205** 536.22:551.481.1

†Schmitz, H. P., **Über die Abkühlung von Binnenseen.** [Cooling of lakes.] *Acta Hydrophysica*, Berlin, 1(1):7–30, **1953.** 3 figs., 34 refs., 65 eqs. German summary p. 7. **DLC**—The classical equations for turbulent heat transfer in water are criticized since they ignore the temperature dependency of density. Especially near 4°C and during warming up periods more complicated relations have to be considered. A one-dimensional treatment shows the laws governing the convection depth during cooling. Specific cases include the formation of a discontinuity and also the nocturnal diminishing of the temperature gradient. A differential equation is developed for the cooling of a water column between 4 and 0°C and solutions are presented for varying initial and boundary conditions. (*Same item as* 10.9–99, *Met. Abstracts.*) *Subject Headings:* **1. Turbulent heat transfer in water 2. Cooling of water bodies 3. Lakes.**—*A.A.*

**12C–206** 551.551.25:551.481.1

Schmitz, William R. and Hasler, Arthur D. (*both, Dept. of Zoology, Wisc. Univ.*), **Artificially induced circulation of lakes by means of compressed air.** *Science*, Wash., D. C., 128(3331):1088–1089, Oct. 31, **1958.** fig., 9 refs. **DLC**—Turbulence induced by air bubbles causes circulation in small thermally stratified lakes. Tests were made under summer and winter (ice cover) conditions. Homoisothermal conditions, isometric concentrations of phosphorus, and increases of dissolved oxygen were achieved at various rates of treatment. The application of the technique for lake management and in studies of lake dynamics is suggested. *Subject Headings:* **1. Lake dynamics 2. Lake management 3. Circulation of lakes.**—*Authors' abstract.*

**12C–207** 551.583.3:551.312.2(474.5)

†Seibutis, A., **Lietuvos TSR pelkių tyrimas ir artimiausi uždaviniai.** [Immediate tasks of bog investigations in the Lithuanian S.S.R.] *Lietuvos TSR Mokslų Akademija. Geologijos ir Geografijos Institutas, Geografinis Metraštis,* 1:51–70, **1958.** 2 photos, 67 refs. Russian and English summaries p. 62–65.—The bog investigation history in Lithuania is subdivided into 3 periods (before 1918; from 1918 to 1940; and from 1940). The work referring to the first period is especially notable, i.e., C. WEBER'S monograph on **Aukštumalė bog.** It is this bog that was investigated and scientifically described for the first time in history. In the second period (1918–1940) bogs were investigated in two ways. The first was that of making bog inventories for industrial purposes, while the second was for scientific purposes. The most notable among the works of the latter type is that on exploring the **Kamanos bog.** This monograph is a classical example among the works on the bog investigation. It was only in the Soviet period that a large scale systematic investigation of bogs started in Lithuania. A number of enriching works on bogs have appeared in this period. In the future the main direction in peat-bog investigation is to include a detailed study of peat-bog formation processes and bog vegetation, as well as studies of bog genesis and formation of organogenic beds. The results of these investigations when enriched by special analyses on peat mass are to form the scientific basis for the rational bog exploitation in the national economy. On the other hand bog investigations are of great interest, constituting an archive of the history of the Post-glacial period. *Subject Headings:* **1. Bog investigations 2. Lithuanian S.S.R.**—*Author's abstract.*

**12C–208** 551.48.018.3 628.13:532.59:519.241.2

Seliuk, E. M., **Raschet vysoty volny i zadachi naturnykh issledovaniĭ volneniia na vodokhranilishchakh.** [Calculation of the height of a wave and problems of investigating waves under natural conditions in water reservoirs.] *Vsesoiuznyĭ Gidrologicheskiĭ S''ezd, Trudy* (Proceedings of the 3rd All Union Hydrological Conference, Oct. 1957), Vol. **4**, issued **1959.** p. 89–97. 2 figs., 4 refs. **DWB** (M79 V985tr)—Different methods for calculation of wave form from other factors, and instruments and methods for wave measuring used in U.S.S.R. are reviewed. Most calculation methods are based on the balance of wave energy. Observation methods and instruments are in two groups: surface (aerial photogrammetric survey) and spot measuring (with aid of wave meters). A statistical calculation method based on observation and using Pearson's frequency distribution curve, is described in detail. Analysis of wavemeter recording graphs can be done either by harmonic analysis or by drawing of "mass wave curves" compounded of sinusoidals. From analysis and computation, charts of wave heights for a given wind velocity are drawn for the whole reservoir. *Subject Headings:* **1. Reservoir wave studies 2. Wave measuring instruments 3. U.S.S.R.**—*J.N.*

**12C–209** 627.1

Shumakov, B. A., **Opresnenie Veselovskogo (Manychskogo) vodokhranilishcha.** [Desalting of Veselovskiĭ (Manych) reservoir.] *Vsesoiuznyĭ Gidrologicheskiĭ S''ezd, Oct. 1957, Trudy,* Vol. 10-issued **1959.** p. 107 112. 2 tables. **DWB**—The author describes the geological past, topography and hydrology of the Manych basin, and of the catchment basin of the Manych River, the mineralization of the western Manych River before and after the construction of the Veselovskiĭ reservoir and the gradual mineralization of the Veselovskiĭ reservoir. The desalting of this reservoir was accomplished by constructing bottom floodgates, by systematically expelling saline waters, by organizing a proper water exchange without emptying the reservoir, and by lowering the water level. With the aid of relevant data, the author discusses the salt regime of the Veselovskiĭ water reservoir during the periods of its filling and water exchange with the waters of the Kuban River, and the salt regime of the reservoir during the water exchange of the period 1952–1956. *Subject Headings:* **1. Desalting of reservoir water 2. Manych Basin, U.S.S.R.**—*I.L.D.*

**12C–210** 551.513.1:551.583.14:551.481.1

Simojoki, Heikki (*Inst. of Marine Research, Helsinki*), **Long rhythmic water level variations in Lake Saimaa compared with the fluctuations in some climatological elements.** *Geophysica*, Helsinki, 5(2):107–112, 1956. 2 figs., 3 refs., table. **DLC**—Water levels at Lake Saimaa, annual precipitation at Helsinki and Uppsala, temperature at Helsinki, and pressure difference between Copenhagen and Stykkisholm (Zonal index) are analyzed harmonically and by the "frequency method" for period 1829 (temp.) or 1847 (other elements) to 1953, and the results are tabulated and shown graphically. Although no predictable cycle was found, and apparent "rhythm" of about 30 years, and a parallel course between water levels on Lake Saimaa and precipitation variations at Helsinki from 1890 was noted. Helsinki temperature shows a marked upward trend since 1880. Precipitation at Uppsala did not agree very well with Helsinki precipitation or with lake levels. (*Same item as* 8.3–158, *Met. Abstracts.*) *Subject Headings:* **1. Lake level variations 2. General circulation rhythms 3. Lake Saimaa, Finland.**—*M.R.*

12C–211 **551.556.8**:551.481.1

†*Sirén, Allan, **On computing the land uplift from the lake water level records in Finland.** *Fennia*, Helsinki, 73(5), **1951.** 181 p. 37 figs., 68 tables, 25 refs. **DLC** (G23.G4)—Effect of wind and atmospheric pressure on water level is considered, in Sec. III (p. 13–26) of this monograph, for numerous lakes in Finland. Direction of wind and duration of wind as well as wind speed effects are considered in great detail, with ample illustrations and data in graphic and tabular form. Methods of computation of wind corrections are also cited. Effect of discharge on water level is taken up in Sec. IV (p. 26–31) and applications to different lake basins in Sec. V (p. 31–84). In one case data analyzed goes back to 1900 and another to 1912 (through 1948). (*Same item as* 9.7–208, *Met. Abstracts.*) *Subject Headings:* **1. Lake level computations 2. Wind effects on lake levels 3. Land uplift calculations 4. Finland.**—*M.R.*

12C–212 **551.579.4**:551.481

Skibniewski, Leonard, **Stanowisko limnologii w stosunku do zagadnien hydrologicznych.** [The position of limnology in relation to hydrologic problems.] *Gazeta Obserwatora PIHM*, Warsaw, 4(1):4–6, Jan. **1951.** 2 refs. table. **DLC**—The part played by lakes in the general process of surface and ground water circulation is discussed. Causes of rise and fall of lake levels are analyzed and explained. (*Same item as* 3.10–250, *Met. Abstracts.*) *Subject Headings:* **1. Limnology 2. Hydrology 3. Lake level variations 4. Ground water circulation.**—*A.M.P.*

12C–213 **551.579.4**:551.481.1

*Skibniewski, Leonard, **Wahania poziomow zwierciadła wody wiekszych jezior projezierza pomorskiego i mazurskiego.** [Level variations of northern Poland's large lakes.] *Przegląd Meteorologiczny i Hydrologiczny*, Warsaw, 7(3/4):159–172, **1954.** 7 tables, 2 figs., 5 refs. In Polish; French resume p. 171–172. **DLC, DWB**—Results of a detailed study of the range of level variations of 6 large (more than 10 km$^2$) lakes in northern Poland, and of the causes of these fluctuations based on water gage recordings for a period of 40 to 100 years, are presented and discussed. It has been found: 1) that variations of the lake levels, presented on 2 diagrams, are peculiar because of their cyclicity, and that the curve delineating them approaches the shape of a sine curve; 2) the fluctuations of levels depend primarily on changes of precipitation amounts which correspond, with a lag of approximately one year; they depend also on the influx of ground water, etc. (*Same item as* 9.4–226, *Met. Abstracts*) *Subject Headings:* **1. Lake level variations 2. Water level fluctuations 3. Poland.**—*A.M.P.*

12C–214 **551.509.324.2**:551.**578.43**

Soderberg, Marshall E., **Study of the influence of Lake Michigan on snowfall at Muskegon, Michigan.** U. S. Weather Bureau, [1954?] 1 p. 4 graphs. Typescript. **DWB**—All cases of snowfall at Muskegon when winds were off the Lake (SW–NNW) during Nov.–Feb. for winters from 1949–50 to 1952–53, were analyzed using only that snowfall which came after the wind shift or cold front passage (cP air mass). A chart is shown for each month outlining in black, red and blue ink the area which encompasses all cases of measureable snow, 2–4″ of snow, and >4″ of snow, respectively, with water temperature as ordinate and minimum temperature as abscissa. For forecasting, the minimum temperature must be predicted and the water temperature obtained from the pumping station intake out in the lake. (*Same item as* 8C–107, *Met. Abstracts.*) *Subject Headings:* **1. Snowfall forecasting 2. Objective snow forecasts 3. Lake influences 4. Muskegon, Mich.**—*M.R.*

12C–215 **551.322**:551.326.85

Sokol'nikov, V. M. (*Baĭkal Limnol. Sta.*), **Obrazovanie l'da na Baĭkale v vesenne-letniĭ period.** [Ice formation on Lake Baikal during spring-summer period.] *Priroda*, Moscow, 44(9):116, Sept. **1955. DLC**—The formation of an extensive crust of young thin ice over the southern and northern parts of Lake Baikal between May and June 1953 is attributed to outgoing radiation associated with complete stillness in both air and water. The atmospheric conditions during which the ice formation occurred are described. *Subject Headings:* **1. Ice formation 2. Lake Baikal, Siberia.** —*I.L.D.*

12C–216 551.579:551.481.1

Sokolov, A. A., **Vliianie ozer na normu stoka rek.** [Influence of lakes on the norm of river flow.] *Meteorologiia i Gidrologiia*, Leningrad, No. 1:36–41, Jan./Feb. **1955.** 2 figs., 2 tables, 3 refs. **DWB**—A water balance scheme for investigating the effect of the influence of lake basins upon the norm of river flow is described. For the European part of the U.S.S.R. it is shown (1) that in a forest zone the river flow diminishes with increasing areal surface occupied by lakes and (2) that in the southern forest zone the lake area of the catchment region sharply influences river flow. (*Same item as* 7.5–216, *Met. Abstracts.*) *Subject Headings:* **1. Lake influences 2. River flow 3. U.S.S.R.**—*I.L.D.*

12C–217 551.481:551.482.213/4(47)

Sokolova, O. K., **Soderzhanie organicheskikh veshchestv v poverkhnostnykh vodakh lesnoĭ zony Evropeĭskoĭ territorii SSSR.** [Content of organic matter in the surface water of the forest zone of the European U.S.S.R.] *Vsesoiuznyĭ Gidrologicheskiĭ S''ezd, Oct. 1957, Trudy*, Vol. 10, issued **1959.** p. 52–59. 2 figs., 2 tables, 10 refs. **DWB**—The author presents the results of studies on the organic matter content and color of surface waters in the forest zone of the U.S.S.R. Graphs showing the seasonal variation of total mineral content and color of the water for small rivers of Leningrad Region, and tables giving data on the organic matter content of the water of streams, small rivers, and of lakes of the forest zone, are presented. In this study of organic matter dissolved in natural waters, a procedure dividing the organic matter into three classes was used as follows: Group I, consisting of humic and ulmic acid, and also containing other organic substances (tannic, protein) which are precipitated from a solution acidified with $H_2SO_4$ up to 0.1 N hydrogen in concentration. Group II, organic humus matter (presumably silicic acid) not analyzed in a pure form. Group III, truly dissolved organic substances into which also brightly colored humic acid enters. The results of analyses of the organic substances in the Karelian Isthmus, various lakes of the Esthonian S.S.R. etc., are discussed. *Subject Headings:* **1. Color of surface water 2. Organic content of surface water 3. European U.S.S.R.**—*I.L.D.*

12C–218 551.461.2:532.59(261.2)

Spadea, M. C., **Oscillazioni libere del Mare del Nord.** [Free oscillation of the North Sea [Preliminary note].] *Annali di Geofisica*, Rome, 11(2):138–144, April **1958.** 2 refs., 2 tables, 2 eqs. Italian and English summary p. 144. **DLC**—The North Sea is considered by the author as a great gulf spread northwards. Theoretical remarks are given about the method which has been used. The North Sea has been divided in 31 sectors. The calculation has been limited to the determination of the main features of the uni- and bi-nodal free oscillations. Concerning the periods, they have resulted respectively of 38 h 30 m for the uni-nodal and 13 h 18 m for the bi-nodal oscillations. *Subject Headings:* **1. Oscillations in the North Sea 2. North Sea.**—*Author's abstract.*

12C–219 551.48.018.4:551.526.84 551.465:551.481.1

Speranskaia, A. A., **Issledovanie turbulentnosti maloprotochnykh vodokhranilishch.** [Investigation of the turbulence in almost stagnant water reservoirs.] *Vsesoiuznyĭ Gidrologicheskiĭ S''ezd, Trudy* (Proceedings of the 3rd All Union Hydrological Conference, Oct. 1957), Vol. 4, issued **1959.** p. 150–157. 3 figs. **DWB** (M79 V985tr)—Moscow University's Department of Physics has observed turbulence phenomena in reservoirs with slowly moving water. The water velocity turbulence fields were observed with the aid of thermohydrometers (turbulimeters). Description of method is given. The water temperature turbulence field was observed with metallic and semiconductor thermometers. Relationships between wave activity and distribution of velocities and temperatures in the vertical are discussed. *Subject Headings:* **1. Turbulence in reservoirs 2. Thermohydrometers 3. U.S.S.R.**—*J.N.*

12C–220 551.508.824:551.584.33:628.13

Speranskaia, A. A., **Rezul'taty raboty samopishushcheĭ stantsii po izucheniiu termicheskogo rezhima vodokhranilishch.** [Results of the work of an automatic recording station in the study of the thermal regime of water reservoirs.] *Vsesoiuznyĭ Gidrologicheskiĭ S''ezd, Trudy* (Proceedings of the 3rd All Union Hydrological Conference, Oct. 1957), Vol. 4, issued **1959.** p. 265–274. 3 figs., 5 refs., 5 eqs. **DWB** (M79 V985tr)—An automatic recording station has been installed at the Utchin Reservoir to record the thermal and dynamic regimes of water reservoirs. The measuring and recording of temperature or air, water, ice and snow, of solar radiation, of light permeability of water, of temperature over the bottom of reservoirs, in ice and snow and soil of shores, of the wind velocity and of wave heights and amplitude are described. The station works all year round. *Subject Headings:* **1. Thermal regime of reservoirs 2. Automatic recording stations 3. Uchin Reservoir, U.S.S.R.**—*J.N.*

12C–221 551.588.4:551.481.1(718)

*§Stark, R. G., **Some effects of Gander Lake on Gander weather.** *Canada. Meteorological Div.*, Cir-2437; Tec-181; *Local Forecast Study*, No. 26, Feb. 17, **1954.** 28 p. 14 figs., 14 tables, 4 refs.

Mimeo. **DWB**—Gander Airport is located near the east end of Gander Lake, Newfoundland, a remarkable lake a mile wide, a mile deep and 33 mi long, and sunk 500 ft below surroundings. Because of its extreme depth, the lake seldom freezes, hence its use as a seaplane base for transatlantic flights in the 1930's. The open water of the lake is a warm source from Oct. to March and cold source from May to Aug. Hourly reports and synoptic charts for 1952 (and Dec. 1951) were used to study 3 main effects of the lake: 1) fog or stratus from lake over airport with W winds, 2) low clouds due to uplift from lake, 3) "Basis" effect. The air masses, winds, synoptic situations and attending fog, sky, visibility and ceiling conditions are analyzed and examples given in text and illustrations by synoptic charts. Minor effects of lake, topography and moisture are also considered. (*Same item as* 6.5–313, *Met. Abstracts.*) *Subject Headings:* **1. Lake influences 2. Local forecast studies 3. Synoptic climatology 4. Gander, Newfoundland.**—*M.R.*

**12C–222** 551.526.8:551.48

Steinhäusser, Hans, **Über die Abkühlungsgrösse in bewegtem Wasser.** [On the cooling power in moving water.] *Meteorologische Rundschau*, 4(3–4):70–71, March–April **1951.** 4 eqs. **DWB**—Bathers in the nearly stagnant Wörther Lake say that the water feels warmer than in the exit stream. Author examines some engineering formulas for cooling power of water and finds that a flow of 1–5 m/s should greatly increase cooling power on human body. (*Same item as* 3.2–114, Feb. 1952, *Met. Abstracts.*) *Subject Headings:* **1. Cooling power of water 2. Lakes and rivers.**—*C.E.P.B.*

**12C–223** 551.481.1:26.01:594.14

Steleanu, Adrian, **Zum Problem der Beeinflussung und Bergenzung des Seenplanktons durch physikalische Faktoren.** [On the physical factors affecting and limiting lake plankton.] *Acta Hydrophysica*, Berlin, 1(1):45–56, **1953.** table, 13 refs. **DLC**—A table gives the optimum and limiting temperatures for phyto- and zoöplankton for a number of lakes in the Alps. Other factors discussed are light, viscosity of water, convection and currents. *Subject Headings:* **1. Plankton 2. Lake ecology 3. Alpine lakes.**—*A.A.*

**12C–224** 551.481.1

†Steleanu, Adrian, **Über den gegenwärtigen Stand der Limnologie in Italien, I. Teil.** [Present state of limnology in Italy, Pt. 1.] Acta Hydrophysica, Berlin, 3(2):53–100, **1956.** 64 refs. **Pt. 2,** *Ibid.*, 3(3):105–138, **1956.** 47 refs. **DLC.** Also his: **Entwicklung und gegenwärtige stand der limnologie in Italien.** [Development and present position of limnology in Italy.] *Forschungen und Fortschritte*, Berlin, 31(8):227–235, Aug. **1957.** 69 refs. **DLC**—Although most of the recent Italian work done in limnology is concerned with hydrobiology, many references are made also to physical limnology, effect of temperature, wind and other meteorological factors. Some papers deal with ice conditions. Most of the exhaustive work was done on the Alpine lakes. *Subject Headings:* **1. Hydrobiology 2. Limnology 3. Alpine lakes 4. Italy.**—*A.A.*

**12C–225** 551.521.1:551.481.1

Steleanu, Adrian, **Der Einfluss eines Sees auf das Strahlungsklima seiner Ufer.** [The influence of a lake on the radiation climate of its shores.] *Forschungen und Fortschritte*, Berlin, 33(4):97–99, April **1959.** photo. **DLC**—After describing in detail the process of reflection of solar radiation from a lake surface the author reports on an experimental investigation on reflection of solar radiation from the surface of Müggel Lake carried out in order to determine the contribution of the reflected sun and sky radiation to the total radiation climate. The radiation receiving surface was situated vertically so that three orientations were studied. These were: (1) a variable orientation normal to a given solar vertical (i.e., with a variable solar azimuth; (2) an invariable southern orientation; and (3) an invariable westerly orientation. Measurements of reflected radiation from the lake surface were made in the region of the near-ultraviolet, in the visible portion of the spectrum, and in the near-infrared. An analysis of the results showed that for a variable solar azimuth reflected radiation amounts to 16% of total incoming radiation in the case of white light on a clear day at the time of equinox. During the winter solstice, it reaches 33% but during the summer solstice, it falls to 10%. The corresponding values for the south and west wall are in the same order of magnitude. The bioclimatic significance of reflected radiation is considered. *Subject Headings:* **1. Lake influences on radiation climate 2. Reflected radiation 3. Müggel Lake, Germany.**—*I.L.D.*

**12C–226** 551.326.85:551.481.1:016

†*Strong, Richard, **Bibliography on lake ice.** Michigan. University Dept of Engineering Research, Contract N6onr-232, Project M720-6, May **1948.** 88 p. 24 tables, 10 figs. **DWB**—This is more than a bibliography. A review of the literature on the main properties of ice is given, arranged according to the following subjects: formation and structure of lake ice, strength, friction, hardness, elastic constants, viscosity and plasticity, ice breakers and ice breaking. The most im-

portant results are presented in tables and figures. The bibliography is based essentially on previous bibliographies published by BARNES (1928) and DORSEY (1940). Numerous Russian papers are mentioned but practically none are examined. A list of contents is given for the most important textbooks. *Subject Headings:* **1. Ice bibliographies 2. Lake ice.**—*A.A.*

**12C-227** 551.326.85:551.481.1

Sundberg-Falkenmark, Malin (*Swedish Met. and Hydrol. Inst.*), **Studies on lake-ice movements.** *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Toronto, Sept.* **1957**, [*Transactions*], Vol. 4, pub. **1958.** p. 266–278. 5 figs., 4 tables, 3 refs. **DWB, DLC**—The phenomenon that lake ice is often pushed up the shores of a lake has been explained to be an effect of the refreezing of waterfilled contraction-cracks in the ice, ensuing from the cooling of the upper layers of the ice sheet at low air temperature. The movements observed by HAMBERG in 1918, prove to be as much as 50% of the theoretical maximum value. The refreezing of cracks of other origin, too, ought to cause similar ice movements. Investigations in a lake in Middle Sweden, where the daily variations in the water level give rise to cracks along the shore, favor this theory. In the lake in question, however, the movements at all places observed, were directed outwards from the shore. This is explained by the fact that there existed zones of weak ice in the ice sheet. The expansion due to the refreezing of shore cracks, appeared as movements ⊥ shore, which were largest where the zone of weak ice was most pronounced; these movements were of about the same size year after year. On the other hand, the movements caused by the refreezing of waterfilled contraction-cracks were not very considerable, except in the winter 1953/54 when the snow cover was thin and then only at the observation places where expansion of large parts of the lake was registered. The movements ‖ shore were as a rule smaller than those ⊥ shore. Finally, it has been possible to obtain an approximate connection between the ice movements ⊥ shore and the variations in the water level. The movements caused by the refreezing of shore-cracks have thus proved to become larger if these variations are increased. (*Same item as* 11.2-87, *Met. Abstracts.*) *Subject Heading:* **1. Lake ice movement.**—*Author's abstract.*

**12C-228** 551.326.85:551.481.1

Synowiec, Adam, **Pomocnicze urządzenia do zimowych badán jeziornych-Świdry do lodu.** [Auxiliary equipment for the investigations of lakes in winter-ice drills.] *Przegląd Geograficzny*, Warsaw, 30(3):485-488, **1958.** 2 figs. Russian and English summaries p. 487–488. **DWB**—Limnological investigations carried out in winter call for a considerable number of openings in the ice covering the lakes. A mechanical, combustion engine propelled ice drill makes possible their quick boring. It may also serve as a means of locomotion over the ice covered lakes. *Subject Headings:* **1. Limnology investigations 2. Ice drills.**—*Author's abstract.*

**12C-229** 551.526.8:551.481.1

†Szaflarski, Józef (*Kraków*), **Warstwa tzw. przedwiosenna w termice wód jezior tatrazńskich.** [The pre-spring time layer in the thermal regime of the lakes of the High Tatras.] *Przegląd Geofizyczny*, Warsaw, 1(3/4):229–239, **1956.** 2 figs., tables, 22 refs. Russian and French summaries p. 238–239. **DWB, DLC**—A layer of water at 0 to 1°C is found above the winter warm water layer and under the ice; it is called the pre-spring layer, and originates in the melting snow and ice on the slopes above the lake. (*Same item as* 10.8-257, *Met. Abstracts.*) *Subject Headings:* **1. Lake temperatures 2. Limnology 3. Tatra Mountains, Poland.**—*M.R.*

**12C-230** 551.526.6/8:551.481.1(52)

*Takahashi, Tado, **A physical treatment on the accumulated materials of the annual temperature variation in lakes and ocean.** *Kagoshima, Japan. Univ. Faculty of Fisheries, Memoirs*, 6:47–76, March **1958.** 7 figs., 15 tables, 11 refs., 3 eqs. **DWB.** Reprinted in *Kyoto. Univ. Meteorological Research Institute, Meteorological Notes*, Ser. 2, No. 13, **1958. DWB**—A practical procedure based on NAMEKAWA'S theory which ingeniously takes into consideration the upward heat flux in the cooling stage. The amount of annual heat exchange and annual mean eddy thermal diffusivity are calculated by this procedure from the annual variation of water temperature in 17 lakes and 113 stations in the sea around Japan. Their vertical and geographical distributions are discussed. (*Same item as* 10.6-214, *Met. Abstracts.*) *Subject Headings:* **1. Lake temperature variations 2. Ocean temperature variations 3. Japan.**—*Author's abstract.*

**12C-231** 551.481

Takano, Kenzo, **Note on the influence of an inlet and intake upon the velocity distribution in the interior.** *Oceanographical Society of Japan, Tokyo, Journal*, 10(3):87–91, **1954. DWB.** Reprinted as *Tokyo. Univ. Geophysical Institute, Geophysical Notes* 8(1), *Contribution* No. 18, June **1955.** 5 p. 3 figs., 17 eqs. **DLC**—Influences of inlets upon the velocity distribution of a lake or a paddy field assumed to be rectangular are treated. They are remarkable in a paddy field but not in a lake. *Subject Headings:* **1. Lake water movements 2. Rice paddies.**—*Author's abstract.*

**12C–232** 551.526.8:551.556.8:551.481

Thompson, R. W. S., **Stratification and overturn in lakes and reservoirs.** *Institution of Water Engineers, London, Journal,* 8(1):19–52, Feb. **1954.** 9 figs., 8 refs. **DWB**—Author discusses thermal stratification in a fresh water lake or reservoir. The typical summer temperature and density profiles are shown and the annual cycle outlined, including effect of dissolved substances. If temperature falls below 4°C in winter, spring warming of surface to 4°C causes an overturn. In summer a thermocline forms at some depth with a wind circulation above. In autumn wind circulation occupies the whole depth. Variations of this typical pattern in some British lakes and reservoirs are shown, and applications to water engineering problems referred to. These are further emphasized in a long discussion. (*Same item as* 5.8–156, Aug., 1954, *Met. Abstracts.*) *Subject Headings:* **1. Lake temperatures 2. Lake circulation.**—*C.E.P.B.*

**12C–233** 551.579.4:551.481.1(678.2)

Tison, L. J., **Variations des niveaux du lac Tanganyika.** [Water level variations of Lake Tanganyika.] *International Association of Geodesy and Geophysics. Association of Scientific Hydrology, Oslo,* **1948,** [*Transactions*], 1:360 362, [1950?] 2 figs. **DWB**—Water level data up to 1947 are presented graphically on the basis of regular observations since 1909 and fragmentary data since 1846. A spectacular decrease of the water level was observed between 1878 and 1885. Estimated annual precipitation over the catchment area is 850 mm from which 97.1% is lost by evapotranspiration. *Subject Headings:* **1. Lake levels 2. Water level variations 3. Hydrologic cycle 4. Evapotranspiration 5. Lake Tanganyika, Africa.**—*A.A.*

**12C–234** 551.579.4:551.481.1(678.2)(480)

*Tison L. J., **Recherches analytiques sur les variations des niveaux des lacs.** [Analytical research on the variation of lake levels.] *International Association of Geodesy and Geophysics. Association of Scientific Hydrology, Brussels, 1951,* [*Transactions*], 3:360–377, **1952.** 4 figs., tables, eqs., 16 refs. **DWB**—Assuming that the inflow in a lake, deducting evaporation from the lake, is a sine function of time, the solutions for the variation of the lake level are discussed in detail for flood waves, propagating through a region of lakes. The characteristic constants are computed for numerous gaging stations in Finland, analyzing the annual and semiannual wave of water level variations. Results are tested also for Lake Tanganyika, giving data for seasonal rainfall and water level variations for a number of stations. *Subject Headings:* **1. Lake levels 2. Flood propagation 3. Water level variations 4. Finland 5. Lake Tanganyika, Africa.**—*A.A.*

**12C–235** 551.582.2(285:584.6)

*Trifonova, T. M., **Klimaticheskie usloviia raĭonov ozera Balkhash i Pribalkhash'ia.** [Climatic conditions of the Lake Balkhash Region and its surroundings.] *Akademiia Nauk Kazakhskoĭ SSR, Alma-Ata. Sektor Geografii, Trudy,* No. 3:3 41, **1959.** 5 figs., 10 tables, 15 refs. **DLC (G23.A34)**—The region is characterized by a sharp continental climate with a very dry hot summer and a cold winter with little snow. The lake and other water reservoirs mitigate the heat and dryness of the air but only in the immediate vicinity. Information on radiation and circulation factors affecting the climate as well as a description of the characteristic features of the four seasons and ample statistical data on air temperature precipitation amounts, snow cover thickness, air humidity, wind speed and direction (including dry winds "sukhovey") are presented and discussed. Two pages are devoted to a discussion of climatic conditions favorable for breeding of muskrats and fish in the lake and on its shores. *Subject Headings:* **1. Climatology of Lake Balkhash 2. Lake Balkhash, Kazakh S.S.R.** —*A.M.P.*

**12C–236** 551.579:551.573:551.481.1(572)

Tseĭtlin, B. S., **Vodnyĭ balans oz. Baĭkal.** [Water balance of Lake Baikal.] Vsesoiuznyĭ Gidrologicheskiĭ S"ezd, Trudy (Proceedings of the 3rd All Union Hydrological Conference, Oct. 1957), Vol. 4, issued **1959.** p. 184–192. fig., 10 eqs. **DWB** (M79 V985tr)—To permit economical planning of the Irkutsk Hydroelectric Power Station on the Angara River, a correct water balance of Baĭkal Lake had to be established. The following elements were observed or calculated between 1899–1955: inflow from catchment area, precipitation, evaporation from lake surface and variation of water stage. It showed that 85% of intake is by surface inflow and 15% by precipitation. Surface outflow by Angara River also constitutes 85% of the total, evaporation is 13% and ground outflow and inflow account for the remaining 2%. A graph indicates average annual and monthly balance. *Subject Headings:* **1. Lake hydrology 2. Water balance of lakes 3. Lake Baikal, Siberia.**—*J.V.*

12C–237 551.573:551.481.1(572)

Tsigmit, Shagandyr, **Uskhaiut li ozera zapadnoĭ Mongolii?** [Are the lakes of western Mongolia drying up?] *Priroda*, Moscow, 44(7):113, July **1955.** 3 refs. **DLC**—In order to solve the controversial question of the drying up of Mongolia's lakes, analyses of water samples of Khara Usu Nur (1760 sq km) and Khirgis Nur (1360 sq km), lakes of the "Great Lake Hollow" north of the Altai Mts., were carried out by 3 investigators (in 1926, Smirnov; 1951, Bespalov; and 1952, the author). Figures show that during 26 yrs no change has occurred in the mineralization of the water of Khirgis Nur where in all 3 investigations it was found to be about 1.46 g/1. This confirms the opinion of investigators who deny the progressive drying up of Mongolia's lakes. On the other hand, the salt content in Khara Usu Nur varies greatly between 0.112 and 0.244 g/l in individual years. The author finds this to be quite normal because it has an outlet and its water level and amount vary greatly due to water inflow, outflow, precipitation amount and evaporation from the lake's surface. (*Same item as* 8.3–240, *Met. Abstracts.*) *Subject Headings:* **1. Evaporation from lakes 2. Lake desiccation 3. Mongolia.**—*A.M.P.*

12C–238 551.521.16:551.481.1:535(796)

Tyler, John E. (*Univ. Calif., La Jolla, Calif.*), **Comparison of light distribution above and below water.** *Journal of Marine Research*, New Haven, Conn., 16(2):96–99, Aug. **1958.** fig., 8 refs. **DWB, DLC**—Measurements of natural light distribution above and below water in Lake Pend Oreille, Idaho, have been made and presented in four curves. The investigation indicates that as the tilt angle increases in the mountain areas the relative radiance of light distribution decreases. *Subject Headings:* **1. Light distribution 2. Lake Pend Oreille, Idaho.**—*N.N.*

12C–239 535:551.463(796)

Tyler, John E.; Richardson, W. H. and Holmes, R. W. (*all, Scripps Inst. of Oceanog., Univ. of Calif.*), **Method for obtaining the optical properties of large bodies of water,** *Journal of Geophysical Research*, Wash., D. C., 64(6):667–673, June **1959.** 5 figs., 4 tables, 5 refs., 14 eqs. **DWB, DLC**—Radiative transfer within a hydrosol such as ocean or lake water can best be described by means of the inherent and apparent optical properties of the hydrosol. Equipment for obtaining the important optical properties of large bodies of water is described and a method for computing six optical properties from measurements of radiance distribution is given. The optical properties of Lake Pend Oreille are computed for one condition of the lake and for one narrow region of the spectrum. The experimental values serve to substantiate certain theoretical relationships between the inherent and the apparent optical properties. *Subject Headings:* **1. Optical properties of water 2. Lake Pend Oreille, Idaho.**—*Authors' abstract.*

12C–240 551.501.1(02):551.481.1

U.S.S.R. Glavnoe Upravlenie Gidrometeorologicheskoĭ Sluzhby, **Nastavlenie gidrometeorologicheskim stantsiiam i postam, Vypusk 7, Chast' 1, Gidrologicheskie nabliudeniia na ozerakh i vodokhranilishchakh.** [Instructions for hydrometeorological stations and posts, Vol. 7, Pt. 1, Hydrological observations on lakes and reservoirs.] Leningrad, Gidrometeoizdat, **1957.** 239 p. 47 figs., 21 tables, 21 forms in appendix (3 fold. in pocket). **DLC** (QC857.R9A47)—This is one of a uniform 10 volume series of instruction manuals (some of which have 3 or 4 parts, each a separate bound volume), giving guidance and regulations for hydrometeorological stations and posts of various types. Vol. 7 contains 2 parts, the present one having to do with specialized observations at limnological stations and hydrological posts on lakes and reservoirs. (The second part, not included in this manual, deals with evaporation measurements on lakes and reservoirs.) General types of observations are outlined under the headings of meteorological observations (precipitation and wind), hydrological observations (water level, water temperature, state of surface, ice phase and ice thickness, snow depth on ice, snow density); and according to place of observation: shore observations, near-shore observations and observations in open sectors of lake or reservoir including vertical profiles, chemical composition of water, and wind, humidity, temperature of air and light penetration, waves, etc. (in Ch. 1). The manual goes into the establishment of networks and stations (Ch. 2), equipment of various types (described and illustrated). Ch. 3 outlines procedures for carrying on observational work; (4) meteorological observations; (5) water level observations, tidal observations; (6) water temperature; (7) optical; (8) hydrochemical; (9) wind waves; (10) ice; (11) currents. Each section gives instructions for observations, care of equipment and working up of results, including sample tables, forms and graphs. Appendix gives lists of equipment needed, correction tables, sample forms and codes for recording ice. (*Same item as* 10.9–32, *Met. Abstracts.*) *Subject Headings:* **1. Observers manuals 2. Limnological observation manuals 3. Hydrologic observation techniques 4. Ice observation techniques 5. U.S.S.R.**—*M.R.*

12C–241 551.506:551.579.1:551.573(766):551.481.1

*†U. S. Navy Electronics Laboratory, San Diego, Calif., **Water-loss investigations, Vol. 1, Lake Hefner studies technical report.** *U. S. Geological Survey, Circular*, 229, 1952. 153 p. 29 tables,

98 figs., refs., 108 eqs. Appendix: **Symbols and dimensions.** This Report also issued as *U. S. Navy Electronics Laboratory, San Diego, Calif., NEL Report*, No. 327, **1952. Vol. 2, Lake Hefner studies base data report.** *U. S. Geological Survey, Professional Paper*, No. 270, **1954.** 300 p. almost entirely tables. Also issued as: *U. S. Navy Electronics Lab. NEL Report*, No. 328, **1954.** Also: **Lake evaporation.** *Meteorological Magazine*, London, 83(960):52–56, Feb. 1954. Also: Harbeck, G. Earl, Jr., **The Lake Hefner water-loss investigations.** *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Toronto, Sept. 1957*, [*Transactions*], Vol. 3, pub. **1958.** p. 437–443. 6 refs., eqs. **DWB.** Also: Harbeck, G. Earl, Jr.; Kohler, Max A.; Koberg, Gordon E., et al., **Water-loss investigations: Lake Mead studies.** *U. S. Geological Survey, Professional Paper*, No. 298, **1958.** 100 p. 46 figs., plate (fold. in pocket), 35 tables, 37 refs. **DGS**—Vol. 1 of this extensive report contains excellent studies by G. EARL HARBECK, R. ERNEST, MAX A. KOHLER and others, on evaporation from Lake Hefner as computed from special measurements and the use of mass-transfer and energy-budget calculations. (*Same item as* 10H–32, *Met. Abstracts.*) Vol. 2 gives the original data upon which the analyses in Vol. 1 are based. For most elements the period of record is April 1950–Aug. 1951. The article in **Meteorological Magazine** contains a Meteorological Office (Great Britain) discussion of Vol. 1 of the Lake Hefner report. Various criticisms are made, and the use of accurate data to test evaporation formulas and energy-budget described in the volume is reported. HARBECK's paper (in *I.U.G.G. Transactions*) is a summary of the 1950–51 Lake Hefner investigations. (*Same item as* 5.3–13, 6.8–16, and 10K–28, *Met. Abstracts.*) The 3rd and final report on water losses at Lake Hefner and Lake Mead, covering the March 1952 Sept. 1953 measurements and studies made on Lake Mead by U. S. Bureau of Reclamation, U. S. Weather Bureau, U. S. Geological Survey and U. S. Navy Bureau of Ships and Electronics Laboratory. Pan and lake evaporation are discussed by M. A. KOHLER, T. J. NORDENSON and WM. E. FOX, and conclusions are set forth by HARBECK and KOHLER. Extensive tables of daily data are given. Equipment and installations are illustrated by excellent full page photos, and analyzed results presented in tables and graphs. Data include precipitation, air temperature, incoming radiation, lake temperature and salinity profiles, wind, humidity, reflected radiation, long wave radiation from lake, pan and lake evaporation, cloud cover, etc. Both energy budget and mass transfer techniques were used to determine the evaporation from Lake Mead during March 1952–Sept. 1953. Sutton-Sverdrup's equations used in Lake Hefner studies could not be used on Lake Mead. Total evaporation in 1953 was found to be 875,000 acre ft, or a depth of 86″ or about 7 ft over the total area of the lake. Maximum monthly evaporation was 117″ in Aug. 1952 and minimum 40″ in Jan. 1953. Wind and humidity did not vary the same way with height. The pan coefficient was 0.70. (*Same item as* 10.5–4 and 10K 116, *Met. Abstracts.*) *Subject Headings:* **1. Water loss investigations 2. Evaporation from lakes 3. Limnology 4. Lake Hefner, Okla. 5. Lake Mead, Arizona-Nevada. I. U. S. Bureau of Reclamation II. U. S. Weather Bureau III. U. S. Geological Survey IV. U. S. Navy Electronics Lab. V. U. S. Navy Bureau of Ships VI. Nordenson, T. J. VII. Fox, Wm. E.** —*M.R.*

12C-242 551.481.1:532.594(436)

Untersteiner, N., **Seiches und Schelfschwingungen, untersucht an einem Alpensee.** [Seiches and short oscillations, investigated in an Alpine lake.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 3(5):423–452, **1951,** 17 figs., 7 tables, 18 refs., 14 eqs. German, English and French summaries p. 423–424. **DWB, DLC**—A new portable limnograph (level recorder) is described. With this and two other instruments series of observations were taken at 26 points round Achensee (Tyrol), from which the standing waves (seiches) were reconstructed. The periods and nodes at different lake levels agreed with those calculated theoretically by A. DEFANT's formula, except at the shallow southern end where they are influenced by friction and where local oscillations developed. *Subject Headings:* **1. Limnology 2. Seiches 3. Lake surfaces 4. Austria.**—*C.E.P.B.*

12C-243 551.579:551.556.8:627.8

Vendrov, S. L., **Issledovaniia ruslovogo rezhima krupnykh vodokhranilishch proizvedennye Giprorechtransom v 1952 1957 gg.** [Investigation of the bed regime of large water reservoirs conducted by the State Institute for the planning of river transport.] *Vsesoiuznyĭ Gidrologicheskiĭ S''ezd, Trudy* (Proceedings of the 3rd All Union Hydrological Conference, Oct. 1957), Vol. 4, issued **1959.** p. 42–50. 8 foot-refs. **DWB** (M79 V985tr)—The State Institute for Planning River Transport investigated three large reservoirs in 1952--57 which are formed by Tsimlyansk, Kamska and Kuibyshev dams. This was done to determine navigation conditions. Research was primarily concerned with characteristics of wind-wave regime, with tidal phenomena, streaming caused by wind and floods, geological and topographic changes, embankments, channel forming process and with topography of reservoirs bottoms. Extensive aerial photographic survey produced 1:10,000 scale maps and radiogeodesic and ultraviolet luminophoric methods were used to investigate shifting of bottom and embankment materials. Five main zones were classified in the reservoir. Extensive investigation of wind-wave and of ground water regime are described in detail. Results help navigation on reservoirs. Further research, mainly of nonstationary waves, sediment transport and channel forming activities is suggested. *Subject Headings:* **1. Reservoir research 2. Reservoir Navigation.**—*J.N.*

**12C–244** 532.594

Verber, James L., **Nomographs for determining seiche periods.** *Science*, Wash., D. C., 116(3003):62–63, July 18, **1952.** 2 figs. **DLC**—Two nomographs, one for very long or very deep lakes and one for short or shallow lakes, are presented. They represent relationships between length and depth of lake and the seiche period. The nomographs were constructed on the basis of Merian's formula simplified by WILLIAM THOMPSON and giving the seiche period in seconds as $2L/\sqrt{gh}$, where $L$ =length of center line along seiche axis, $g$ =gravity, and $h$ =average depth of basin. *Subject Headings:* **1. Seiches 2. Nomographs.**—*G.T.*

**12C–245** 551.526.8

Verber, James L.; Bryson, R. A. and Suomi, V. E. (*Wisc. Univ.*), **Short time variation of temperature in Lake Mendota, Wisconsin.** *Ohio Journal of Science, Columbus*, 53(2):72–76, March **1953.** 6 figs., 2 refs. **DLC**—As a result of extensive water temperature surveys made in Lake Mendota on 4 days in Aug. 1949, short-time temperature variations are identified and coordinated with wind activity. It is found that the changes in water temperature "can best be accounted for by wind-driven currents within the lakes." (*Same item as* 6.2–189, *Met. Abstracts.*) *Subject Headings:* **1. Lake temperatures 2. Wind driven currents 3. Lake Mendota, Wisc.**—*G.T.*

**12C–246** 551.481.1:016

†Verber, James L., **Bibliography of physical limnology, 1781–1954.** *Ohio. Dept. of Natural Resources, Report of Investigations*, No. 25 (Contribution No. 4, Lake Erie Geological Research Program), **1955.** 57 p. **DWB**—This compilation consists of a bibliography and a subject index of the literature on the physical limnology of the Great Lakes. The references are listed alphabetically, and the publications of each author are arranged chronologically according to their year of publication. The subject index "is keyed to the literature cited in the Bibliography by author's last name and publication date." (*Same item as* 7.4–39, April, 1956, *Met. Abstracts.*) *Subject Headings:* **1. Bibliography on physical limnology 2. Limnology.**—*I.L.D.*

**12C–247** 551.481.1

Verbolov, V. I., **K voprosu o techeniiakh v Baĭkale.** [The problem of currents on Lake Baikal.] *Akademiia Nauk SSSR, Doklady*, 112(2):307–310, Jan. 11, **1957.** fig., table, 8 refs. **DLC**—Measurement of water flow below the ice cover was carried out to considerable depths during the beginning of 1955 in Lake Baikal and the results of observations are presented in a table. The existence of currents beneath the ice cover embracing the thickness of water to depths of 450–600 m was established. Currents may exist also at greater depths. The velocity of the currents at the upper layer (0–50–100 m) attains 6–7 cm/sec but is 5–6 cm/sec in the lower layer (100–600 m). (*Same item as* 9.8–68, *Met. Abstracts.*) *Subject Headings:* **1. Lake currents 2. Lake Baikal, Siberia.**—*I.L.D.*

**12C–248** 525.623:551.465:532.593:551.526.8(572)

Verbolov, V. I., **Vliianie vnutrennikh voln i sgonno-nagonnykh iavlenii na raspredelenie temperatury vody v oz. Baĭkal.** [Influence of internal waves and tidal phenomena on the water temperature distribution in Lake Baikal.] *Vsesoiuznyĭ Gidrologicheskiĭ S"ezd, Trudy* (Proceedings of the 3rd All Union Hydrological Conference, Oct. 1957), Vol. 4, issued **1959.** p. 258–265. 3 figs., 3 tables, 7 refs. **DWB** (M79 V985tr)—According to observations on Lake Baikal in Siberia (1954–56), waves and tides caused by winds provoke rapid and sudden changes in the temperature of water in the 150 m deep top layer. Seiches have been observed having a cycle of 38 days; internal waves have caused a variation of temperature each 3, 7, 26 and 70 hours. Also very frequent temperature variations of 3 seconds up to 7 minutes have been observed. Variations of chemical content are also caused by internal waves. *Subject Headings:* **1. Lake temperature variations 2. Wind effects on temperature 3. Lake Baikal, Siberia.**—*J.N.*

**12C–249** 582.2:551.481.1:551.521.16(7:285)

Verduin, Jacob, **Phytoplankton and turbidity in western Lake Erie.** *Ecology*, Durham, N. C., 35(4):550–561, Oct. **1954.** 5 figs., 3 tables, refs., 5 eqs. **DLC**—The highest phytoplankton crop observed during the period of 1949–1953 was the spring crop of 1949 which was associated with transparencies permitting 1% of surface light to penetrate 4.8 m. Maps showing the horizontal distribution of turbidities are presented. A graph of phytoplankton crops against the depth associated with 1% of surface light shows that the highest crops occurred in waters of intermediate turbidity. The effectiveness of light quenching has been determined by computing the value of k in an equation derived from Lambert-Beer's Law. *Subject Headings:* **1. Phytoplankton 2. Light penetration into lakes 3. Lake Erie.**—*I.L.D.*

**12C–250** 551.582.1(572) 551.481.1

Vereshchagin, Gleb Iul'evich, **Baĭkal: nauchno-populiarnyĭ ocherk.** [Lake Baikal: popular scientific sketch.] *Moscow, Gos. Izdat. Geograficheskoĭ Literatury,* **1949.** 226 p. illus., 3 tables, graphs, map (fold.) **DLC**—Besides the descriptive material on the physiography, geology, flora and fauna in this book, the chapter on **Water masses of Lake Baikal** (p. 64–95) and the one on **Climatic characteristics of Lake Baikal** (p. 96–103) contain information and data of interest to limnologists and climatologists. The chemical composition, the water balance, temperature of water at the surface and down to a depth of 900 m, ice cover and shore ice conditions are treated in the former chapter, and the effect of the lake on temperature above and around the lake, and the effect of the climate on vegetation and life in the vicinity are outlined briefly in the latter chapter. (*Same item as* 4.7–181, *Met. Abstracts.*) *Subject Headings:* **1. Limnology 2. Climate of Lake Baikal 3. Lake Baikal, Siberia.**—*M.R.*

**12C–251** 551.481.2

Veselovskiĭ, N. V., **Gidrokhimicheskiĭ rezhim prudov zasushlivykh raĭonov Evropeiskoĭ territorii SSSR.** [Hydrochemical regime of ponds in the arid regions of the European U.S.S.R.] *Vsesoiuznyĭ Gidrologicheskiĭ S''ezd, Oct. 1957, Trudy.* Vol. 10, issued **1959.** p. 102–106. table. **DWB**—On the basis of data collected in the Rostov and Stalingrad Regions and in Stavropol Territory, the author investigated the formation and chemical regime of the waters of ponds. The principle water source of steppe ponds is atmospheric precipitation. The chief source of the principle ions ($Cl^-$, $SO_4^{--}$, $HCO_3^-$, $Ca^{++}$, $Mg^{++}$, $Na^+$ and $K^+$) are the salts of the water soluble part of the soil and of its underlying rocks. In the steppes the water soluble salts consist of hydrocarbonates ions and calcium and sometimes sodium formed in solonchak soils as a result of exchange processes. The soils of primary terraces of ravines and of desicated steppe rivulets may be highly salinified from the surface. Depending upon the water source, ponds are classified into those supplied only with water of surface runoff and those filled with water from surface and underground runoff. The former may, in the course of many years, contain slightly mineralized water of the hydrocarbonate class; in the latter the degree of mineralization varies from pond to pond and year to year, and the salinity of the ponds is of the chloride, sulfate and chloride-sulfate classes. The chemical composition of water of ponds depends upon the variation of the spring filling up. During sudden snow thaw and intense spring rains a considerable amount of water flows over the surface of the catchment basin without dissolving a perceptible quantity of salts. Nevertheless, the spring inflow cannot renew sufficiently the pond water if most of the pond is filled in winter. During gradual snow melt considerably mineralized water may flow into ponds. During spring filling the nonhomogeneity of pond water, in both composition and mineralization, is manifested both vertically and horizontally. Between spring floods the hydrochemistry of ponds is characterized by a gradual increase in mineral content as a result of evaporation and inflow of ground water. Also, sulfate ions are present in the bottom layers as a consequence of bacterial processes. The surface waters may become saturated with oxygen because of intense photosynthetic processes. The mineralization of pond water in the steppe region was found to increase from the vertex to the outlet. During the period of open water, the upper horizon contains dissolved oxygen in amounts close to saturation; in summer and fall saturation up to 120% is observed. *Subject Headings:* **1. Hydrochemical regime of ponds 2. Ponds 3. European U.S.S.R.** —*I.L.D.*

**12C–252** 550.373:551.481.1(572:285)

Vinogradov, P. A., **Izmerenie vertikal'noĭ sostavliaiushcheĭ elektrotelluricheskogo polia v. oz. Baikal.** [Measurement of the vertical constituent electrotelluric field in Lake Baikal.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.* No. 1:83–86, Jan. **1959.** 3 figs., 8 refs. **DLC**—Variations of potential differences between electrodes along one vertical at different depths of Lake Baikal were measured since such measurements are superior to those in other places because of low mineral content and purity and homogeneity of the waters of this lake. Electrodes were placed at depths of 5200 and 1100 m and at 5 and 400 m. Special attention was devoted to the measurement of the vertical components of short period oscillations of the earth's electric field. The existence of a vertical component of short period oscillations of the earth's electric field is definitely established. The amplitude of the vertical components of the short period fluctuations is considerably less than the amplitude of the horizontal components. An increase in the current to the east and south in the horizontal lines corresponds to an increase of current downward in the vertical lines and vice versa. The amplitude of vertical components of short period components increases with an increase in the length of the measuring lines. Data are presented in the form of graphs. *Subject Headings:* **1. Electrotelluric field measurements 2. Lake Baikal, Siberia.**—*I.L.D.*

**12C–253** 551.579.4:551.481.1(492:285)

Volker, Adrien, **Bilan d'eau du lac Ijssel.** [Water balance of Lake Ijssel.] *International Union of Geodesy and Geophysics, Association of Scientific Hydrology, Oslo* **1948**, [*Transactions*], 1:320 326, [**1950?**] 2 figs., table. Also his: **Mouvements des eaux du lac Ijssel.** [Water currents of Lake Ijssel.] *Ibid.*, 1:386–391. 4 figs. **DWB**—The author computed the monthly and annual water balance taking into account the following: discharge from the Ijssel River, the adjacent polders and surrounding terrain; precipitation over the lake (660 mm per annum); estimated evapotranspiration from the lake (660 mm) and outflow of ground water. 3600 mm per annum must be removed by mechanical means. In the second paper, the author discusses currents in the lake caused by wind, and shows isoline maps for selected situations. (*Same item as* 9D–4, *Met. Abstracts.*) *Subject Headings:* **1. Lake currents 2. Evaporation from lakes 3. Hydrologic cycle 4. Lake Ijssel, Netherlands.**—*A.A.*

**12C–254** 582.2:551.521:551.481.1(494,45:285)

Vollenweider (*Istituto Italiano di Idrobiol., Pallanza, Italy*), **Strahlungsklima und Assimilation des Phytoplanktons in einem tiefen Alpenrandsee.** [Radiation climate and assimilation of phytoplankton in a deep marginal Alpine lake.] *Wetter und Leben*, Vienna, 7(3/4):57–61, **1955.** fig., 3 refs., 3 eqs. **DLC**—The $CO_2$ assimilation of phytoplankton in a transparent oligotrophic marginal Alpine lake was investigated by an analysis of the radiation climate and the assimilation dependent upon it in Lake Maggiore. With the aid of a graph the author discusses the annual variations of total radiation (1954–55), transmission variation of the water to green (1954–55), isopleth of similar (green) brightness, mean temperatures 0–15 m in degrees Centigrade and assimilation area. The relationship between the plankton biocenose to the light gradient and temperature and the annual production of organic substance (glucose) are considered. *Subject Headings:* **1. Radiation effects 2. Phytoplankton 3. Carbon dioxide absorption 4. Lake Maggiore, Italy.**—*I.L.D.*

**12C–255** 551.481/2:551.482.214(584.6)

Voronkov, P. P., **Gidrokhimicheskaia kharakteristika rek i ozer Severnogo Kazakhstana.** [Hydrochemical characteristics of rivers and lakes of northern Kazakhstan.] *Vsesoiuznyĭ Gidrologicheskiĭ S''ezd, Oct. 1957, Trudy*, Vol. 10, issued **1959.** p. 59–67. fig., table. **DWB**—Northern Kazakhstan is not favorable to the formation of surface waters of good hydrochemical quality source. The soil surface over a large part of this region shows a high chloride ion (chiefly NaCl) and, in some cases, a high sulfate ion content independently of the degree of salinification of the soil cover. The waters have a low mineral content, 50–100 mg/l and the predominating ions are $HCO_3^-$ and $Ca^{++}$. In individual instances $Na^+$ ions may predominate and only rarely $Mg^{++}$ ions. Owing to the fact that soil surface waters flowing along rivulets of slopes are a mixture of surface-slope and soil surface waters; the latter characterized by a higher mineral content than the former and by a higher content of sulfates and chlorides; their constitution varies with the proportion of each source of water. In Northern Kazakhstan the waters have an increased mineral content, especially of Cl and $Na^+$ ions in spring floods. On the basis of the degree of salinification of the soil-ground water shale and the consequent chemical composition of the surface waters, the catchment basins of northern Kazakhstan can be classified into three groups, each of which is characterized by a particular degree of mineralization and particular anions and cations. Descriptions of development of these three types and of the development of the chemical constitution of the lakes of northern Kazakhstan as compared with the mineralization of channels, are given. Data on the characteristics of the variation of mineralization and chemical composition of waters of various bodies of water, and graphs showing the seasonal variation of mineralization and of chemical components of channel waters are presented. *Subject Headings:* **1. Hydrochemistry 2. Lakes 3. Rivers 4. Kazakh S.S.R.**—*I.L.D.*

**12C–256** 551.579:551.481.2(584.6)

Voskresenskiĭ, K. P., **Raschet zaileniia prudov v raĭonakh osvoeniia tselinnykh zemel' v Severnom Kazakhstane.** [Calculation of the silting-up of ponds in regions of virgin land reclamation in northern Kazakhstan.] *Vsesoiuznyĭ Gidrologicheskiĭ S''ezd, Trudy* (Proceedings of the 3rd All Union Hydrological Conference, Oct. 1957), Vol. 4, issued **1959.** p. 74–79. 2 figs. **DWB** (M79 V985tr)—The silting-up of small ponds in northern Kazakhstan cannot be calculated from observations of sediment transport on larger rivers. A new method used by the State Hydrological Institute computes the period of silting-up from the degree of erosion in the water-shed of the pond and the regime of water exploitation in the pond. General description of the method and factors influencing the silting-up are given. *Subject Headings:* **1. Pond silting 2. Kazakh S.S.R.**—*J.N.*

**12C–257** 535.345:551.481.1(497.2)

*Vranski, V. K.; Markov, P. K. and Peeva, A. T., **Khidrofizichni izmervaniia v'v vodite na stalinskoto ezepo-V.** [Hydrophysical measurements in Stalin Lake.] *Bulgarska Akademiia na*

*Naukite, Sofia, Izvestiia, Otdelenie za Fiziko-Matematicheski i Tekhnicheski Nauk, Seriia Fizicheska,* 4:251–265, **1954.** pub. **1955.** 15 figs., 5 tables, 6 refs.—Observations of transparency of the water of Stalin Lake down to 18 m were made in 1952 (summer) and 1953 (winter). Comparison shown in graphs indicates that transparency is greater in winter than in summer. Stability of the water is a determining factor. Measurements made with a Pulfrich photometer differ little from those made by the "trans-parensimetric" method. The spectral distribution for three filters used differs little from summer to winter. Red shows strongest and blue weakest penetration. Comparison is made between a rain-disturbed summer (1951) and not so rainy summers (1952 and 1953). *Subject Headings:* **1. Light penetration in lake water 2. Stalin Lake, Bulgaria.**—*M.R.*

**12C–258** 551.**579.4**:576.8

Wawrik, Friederike (*Biological Sta., Lunz Lake*), **Nährstoffkonzentration und Produktionsmaxima als Funktionen des Pegelstandes.** [Concentration of nutrients and production maximum as functions of water level.] *Wetter und Leben*, Sonderheft Vienna, No. 1:38 40, May **1952.** 8 refs. **DLC**—The nutrients concentration of flowing and stagnant water is compared. In the case of the Lunz Untersee, a rise in water level indicating a renewal of water by ground water addition was followed by an increase in various types of plankton. The individual species are listed. Other species are favored by stagnant water. *Subject Headings:* **1. Water level variations 2. Microorganisms.** —*I.L.D.*

**12C–259** 551.481(02)

†Welch, Paul Smith (*Michigan Univ.*), **Limnological methods.** Phil., Blakiston, **1948.** 381 p. 97 figs., 7 tables, refs. at end of each ch., bibliog. p. 367–370. **DLC** (QH96.W39)—This book presents the essentials of the basic methods necessary for introduction to the subject, limnological surveys of lakes and streams, and fundamental information upon which specialized research depends. Each method is presented in the form of simple basic directions for procedure, with supplementary information, directions, and additions assembled at the end of each section. Lake and stream mapping is stressed. A few simple methods and descriptions of improvised instruments are included for the benefit of those whose facilities are limited. Forms for records are presented in a few instances as samples to show how these useful devices can be constructed. Chemical methods used in routine work have been included. The physical methods described concern gathering information on temperature, turbidity, color, water movement, light penetration, wind velocity, and bottom materials. The biological methods are concerned with collecting and preparing plankton, bottom-fauna, and plant-inhabiting organisms for study. *Subject Headings:* **1. Limnology textbooks 2. Limnological observations techniques.**—*E.Z.S.*

**12C–260** 551.481(02)

†Welch, Paul Smith (*Mich. Univ.*), **Limnology.** 2nd ed. N. Y., McGraw-Hill, **1952.** 538 p. 50 figs., 56 tables, bibliog. p. 443–510. **DLC** (QH96.W4)—This textbook is planned for the use of senior and graduate students, with training in physics, chemistry, botany and zoology. Preliminary consideration is given to the origin and nature of inland waters. Biological relations are given major emphasis. The influence of physical and chemical conditions in inland waters on the various life forms is considered in detail. Separate studies are presented on: plankton, bacteria, other fungi and the nonplankton algae, larger aquatic plants, nekton and benthos. Biological productivity of inland waters is summarized. Some special type of lentic and lotic environments are described and the biological relationships within them are outlined. An appended bibliography includes not only lists of literature specifically referred to in the text but also many additional references selected because of their usefulness in gaining information in the subjects involved and in supplementing the text. *Subject Headings:* **1. Limnology textbooks 2. Lentic environments 3. Lotic environments.**—*E.Z.S.*

**12C–261** 551.**556.8**:551.481.1(52:485)

Yahagi, M., **On the relation between winds and waves in the Lake Kasumigaura.** *Journal of Meteorological Research*, Tokyo, 8(8):528–531, Oct. **1956.** 7 figs., table. In Japanese. **DWB, DLC** —Observations were made at Saga, Aso and Ukishima (along Lake Kasumigaura) to determine the depth (maximum 7 m) and fetch for a colonization project on the lake. Using Robinson's cup anemometer and automatic recorder and wavemeter in water depth of 1 m, the result of observations in 1954 only is presented in this paper. Wave length and speed are calculated by the formula $T = \sqrt{(2\pi\lambda/g)} = (2\pi/g)C$ and are found to be different from the experimental value obtained by both Sverdrup and Munk. The relation of wave height and wind velocity with its duration to the fetch of 4000 m, 9500 m, and 12,000 m from Saga has been tabulated and shown in figs. 4 to 7. The ratio of wave height varies according to wind velocity; 5–7 m/s of wind velocity was the highest, and the longer the duration of wind the higher the wave. *Subject Headings:* **1. Wind-wave relationships 2. Lakes 3. Lake Kasumigaura, Japan.**—*K.C.*

**12C–262** 551.553.11:551.481.1(52)

Yamashita, I., **Lake wind on the Lake Suwa.** *Journal of Meteorological Research*, Tokyo, 5(8):701–702, Sept. **1953.** 5 figs. In Japanese; English summary p. 701. **DWB**—Lake Suwa is 14 sq m in area; the southern coast having a steep slope, the northern a gentle slope, the eastern a broad open field, and the River Tenryu flowing out from the western side. The features of wind round the lake from morning till evening are as follows: A) there exists the same phenomenon as land and sea breeze in the morning and evening, especially on the gentle slope of the northern coast; B) the wind blowing up the River Tenryu sometimes becomes strong. (*Same item as* 7.8–177, *Met. Abstracts.*) *Subject Headings:* **1. Lake breezes 2. Lake Suwa, Japan.**—*Author's abstract.*

**12C–263** 551.481.1(510)

Yang, Hsi-ch'en (Nanking Inst. of Geog.), **New studies on Chinese Lakes.** *Jen-min Jih-pao.* 5 p. Sept. 14, **1960.** **DWB**—The importance of limnology for the Chinese economy, the extent of lake and pond resources, use in flood control and agriculture, history of limnology abroad and in China, difference in viewpoint between Western and Russo-Chinese (complex) approach, role of geology, geomorphology, hydrochemistry, hydrobiology, hydrology, etc. in studies of lakes; dual character of such studies: (1) study of hydrology, biology, chemistry and physics of the lake itself, and (2) study of lake basins and environment in their interrelationships, all aimed at a unified concept of lake utilization. A rapid and detailed survey of Chinese Lakes along these lines is spelled out in some detail. Some work is already being done by the Institute of Hydrobiology of the Academia Sinica. *Subject Headings:* **1. Limnology in China 2. China.**—*M.R.*

**12C–264** 551.582:551.481.1(439.1)

Zách, Alfréd, **Érdekes adatok a Balaton különleges idöjárási vixzonyaihoz.** [Interesting data on the particular weather conditions of Lake Balaton.] *Thermészet és Technika*, Budapest, 111(9): 571–573, Sept. **1952.** figs. **DLC**—Among the climatic features of Lake Balaton the author discusses: (1) radiation. Reflection from the water surface increases radiation, especially during wave activity. Comparative data on monthly total radiation at Budapest and at Balatonfüred are presented. (2) Wind. Strongest wind on record is 94 m.p.h. Land-and-sea breezes produce local climatic effect. Obstruction by mountain range in the north causes limited föhn effect, sudden gusts, turbulence and considerable wave activity. Fata morgana is a side feature of the föhn effect. Most (75%) of the strong winds come from NW. (3) Evaporation. It is more intense over the shallow, marshy southern part of the lake than over deep waters or the land. This difference causes instability, ascending air and cloud formation. (*Same item as* 5.10–200, Oct. 1954, *Met. Abstracts.*) *Subject Headings:* **1. Local climates 2. Lakes and rivers 3. Orographic effects 4. Lake Balaton, Hungry.**—*G.T.*

**12C–265** 551.579:551.481.1(02)

Zaĭkov, B. D., **Struktura i metodicheskie osnovy uchebnogo posobiia "Obshchee ozerovedenie."** [Structure and methodological bases of the textbook "General limnology."] *Vsesoiuznyĭ Gidrologicheskiĭ S''ezd, Trudy* (Proceedings of the 3rd All Union Hydrological Conference, Oct. 1957), Vol. 4, issued **1959.** p. 14–17. **DWB** (M79 V985tr)—Two approaches to limnology are discussed: physico-mechanical and geographical, subdividing the science into general limnology and comparative limnology (lake hydrography). The author stresses the importance of lakes in the U.S.S.R.; the largest and deepest in the world are in this country. After a short survey of limnology literature in the U.S.S.R., in his textbook (now being compiled) **General limnology** is described. It consists of six parts, concerned with the following topics: lake beds, lake water, water balance and stage, dynamical, thermal and color phenomena. *Subject Headings:* **1. Limnology textbook 2. Lake hydrography 3. Limnology bibliographies 4. U.S.S.R.**—*J.N.*

**12C–266** 551.481.1(479.24)

Zamanov, Kh. D., **Ozera Azerbaĭdzhanskoĭ SSR.** [Lakes of Azerbaidzhan.] *Vsesoiuznyĭ Gidrologicheskiĭ S''ezd, Trudy* (Proceedings of the 3rd All Union Hydrological Conference, Oct. 1957), Vol. 4, issued **1959.** p. 280–282. 3 refs. **DWB** (M79 V985tr)—A geographical classification of lakes is given for the Azerbaidzhan Soviet Republic, as well as short description of their chemical content. *Subject Headings:* **1. Lake classification 2. Azerbaidzhan S.S.R.**—*J.N.*

**12C–267** 551.464(262.8/.9)

*Zenkevich, L. A. (*Inst. of Oceanology, Moscow*), **Caspian and Aral Seas.** *Geological Society of America, Memoir*, No. 67, Vol. 1:891–916, Dec. **1957.** 6 figs., 19 tables, 7 refs. **DLC** (QH542.N3)—The Caspian Sea is the world's largest inland sea and is a relict sea (salinity average 12–13%) with the original relict fauna. About 76% of the water comes from the Volga. Income is about 125–135 cm/yr, and is equal to evaporation though during the past 20 years the level has dropped 2m, and in some eras it has been even lower. Climatic conditions and water temperature variations are summarized and tabulated for various regions of the Caspian. Salinity varies from 5–10% in central part to 200% (or even 285% in places) in the Kara-Bugaz Gulf. Oxygen disappears in bottom waters. Plankton are discussed extensively. The Aral Sea is the 4th largest inland sea in the world. Salinity is 10% but sulphate content is 31% of total of all salts and NaCl 54%. Temperature at surface reaches 24–27%. Chemical composition is compared with that of ocean average, Caspian, etc. *Subject Headings:* **1. Hydrography of Caspian Sea 2. Salinity of Caspian Sea 3. Salinity of Aral Sea 4. Caspian Sea 5. Aral Sea.**—*M.R.*

**12C–268** 551.526.8:551.481.1(43)

Zorell, Franz, **Der Einfluss des Walchensee-Kraftwerks auf den Temperaturhaushalt des Kochelsees.** [The influence of the Walchensee power station on the thermal economy of Lake Kochel.] *Erdkunde,* 9(1):44–52, **1955.** 5 figs., 4 tables, 16 refs. **DWB**—Temperatures to a depth of 30 m before and after the building of the power station are analyzed. After the power station was built temperatures were lower at the surface but much higher (up to 5°C) below 10 m. This is attributed to the high velocity with which water from the power station enters the lake. (*Same item as* 6.8–79, *Met. Abstracts.*) *Subject Headings:* **1. Lake temperatures 2. Lake Kochel, Germany.** —*C.E.P.B.*

# PART III. RECENT TRANSLATIONS AND ANALYTICS FROM SERIALS AND COLLECTED WORKS

**Note:** Material listed in these sections will not be included in the monthly indexes until abstracted. The item number is mentioned for those titles which have been abstracted in previous issues of **Meteorological and Geoastrophysical Abstracts.**

## A. TRANSLATIONS

**Akademiia Nauk SSSR, Bulletin [of the] Academy of Sciences, USSR, Geophysics Series,** No. 7, July 1959 (Transl. of its original **Izvestiia, Ser. Geofizicheskaia,** No. 7, July 1959, issued by American Geophysical Union, July 1960)

Tikhonov, A. N. and Skugarevskaia, O. A.: **Asymptotic behavior of the process of generating an electromagnetic field in a laminated medium,** p. 667–671

Tikhonov, A. N. and Shakhsuvarov, D. N.: **Electromagnetic field produced by a dipole at points in distant zones,** p. 672–677

Rykunov, L. N.: **P-waves diffracted at the Earth's core and rigidity of the core,** p. 678 684

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Sergieva, A. P.: **Electrical charges of cloud droplets,** p. 721–726

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Kuz'mina, N. V.: **Use of converted waves in the study of the structure of the Earth's crust in the southeastern portions of the Main Caucasus Range,** p. 734–743

Radzhabov, M. M.: **Some special features of transverse travel-time curves for refracted waves,** p. 744–748

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Berdichevskiĭ, M. N. and Briunelli, B. E.: **Theoretical premises of magneto-telluric profiling, p. 757–762**

Rotshteĭn, A. Ia. and Tsirel', V. S.: **Some results of experiments conducted with a nuclear magnetometer,** p. 763–765

Levin, L. M.: **Electrostatic precipitation of aerosol particles from a flow upon large bodies,** p. 766–767

Rovinskiĭ, F. Ia.: **New methods of recording water drops,** p. 768–770

Karol', I. L.: **Influence of the layer of the atmosphere near the Earth on the spread of a heavy homogeneous contaminant originating at a high instantaneous point source,** p. 771–775

Arkhangel'skaia, V. M.: **Conference on the results of the research work of the Central Seismological Station "Pulkovo" and the investigation of surface waves,** p. 776–777

No. 11, Nov. 1959, issued Aug. 1960

Keĭlis-Borok, V. I. and Monin, A. S.: **Magnetoelastic waves and the boundary of the earth's core,** p. 1089–1095

Liustikh, E. N.: **On the hypothesis of thalassogenesis and on the movement of blocks in the earth's crust,** p. 1096–1101

Savarenskiĭ, E. F.: **On the determination of group and phase velocities from observations,** p. 1102–1107
Pod''iapol'skiĭ, G. S.: **On a certain formula connecting the coefficients of head waves with reflection and refraction of coefficients,** p. 1108–1113
Sukhodol'skiĭ, V. V.: **An apparatus for recording inclinations and accelerations in the determination of gravity at sea,** p. 1114–1119
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Pospelova, G. A.: **Remanent magnetization of Tertiary and Quarternary volcanic rocks,** p. 1126–1130
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**Akademiia Nauk SSSR. Astronomicheskiĭ Sovet, Bulletin of Stations for Optical Observations of Artificial Earth Satellites,** No. 7, 1959 (English transl. issued by **U. S. National Aeronautics and Space Administration,** as its **Technical Translation F-19,** May 1960, of original Russian **Biulleten' Stantsiĭ Opticheskogo Nabliudeniia Iskusstvennykh Sputnikov Zemli**)

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Iaroshevich, S. V.: **Computer operating with the AT-1 telescope,** p. 30–34
Bugoslavskaia, Ia. E.: **Special satellite plate holder ("Sp. K"),** p. 35–36
Poroshin, F. M.: **A method for photographing the rocket carrier of the third artificial earth satellite by means of narrow film (35 mm) cameras,** p. 37–38
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**Observations of artificial earth satellites by foreign stations,** p. 47–50

# B. ARTICLES APPEARING IN RECENTLY ISSUED PUBLICATIONS

## Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz., No. 10, Oct. 1960

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**Acta Geophysica Polonica,** [Warsaw].
**Acta Meteorologica Sinica,** [Peking].
**Akademiia Nauk SSSR, Izvestiia, Ser. Geogr.** and **Ser. Geofiz.,** [Moscow].
**American Geophysical Union, Transactions,** [Washington].
**American Meteorological Society, Bulletin,** [Boston].
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**Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A and Ser. B,** [Vienna].
**Australian Journal of Physics,** [Melbourne]
**Beiträge zur Physik der Atmosphäre,** [Frankfurt a. Main].
**Ciel et Terre,** Société Belge d'Astronomie, Météorologie et Physique du Globe, [Brussels].
**Geofisica e Meteorologia,** Società Italiana di Geofisica, [Genoa].
**Geofisica Pura e Applicata,** Istituto Geofisico Italiano, [Milan].
**Geophysical Magazine,** Japan Meteorological Agency, [Tokyo].
**Hemel en Dampkring,** [The Hague].
**Időjárás,** Magyar Meteorológiai Társaság and Országos Meteorológiai Intézet, [Budapest].
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**Journal de Mécanique et de Physique de l'Atmosphère,** Société Météorologique de France.
**Journal of Atmospheric and Terrestrial Physics,** [London].
**Journal of Geophysical Research,** [Washington].
**Journal of Meteorological Research,** [Tokyo].
**Journal of Meteorology,** American Meteorological Society, [Boston].
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**Meteorologiia i Gidrologiia,** [Leningrad].
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**Monthly Weather Review,** U. S. Weather Bureau, Washington, D. C.
**Polarforschung,** Archiv für Polarforschung, [Kiel].
**Przegląd Geofizyczny,** [Warsaw].
**Revista de Geofísica,** Instituto Nacional de Geofisica, [Madrid].
**Rivista di Meteorologia Aeronautica,** Servizio Meteorologico, [Rome].
**Royal Meteorological Society, Quarterly Journal,** [London].
**South Africa, Weather Bureau, Notos,** [Pretoria].
**Tellus,** Svenska Geofysiska Föreningen, Stockholm.
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**Weather,** Royal Meteorological Society, [London].
**Weatherwise,** American Meteorological Society, [Boston].
**Wetter und Leben,** Österreichische Gesellschaft für Meteorologie, [Vienna].
**WMO Bulletin,** World Meteorological Organization, [Geneva].
**Zeitschrift für Meteorologie,** Meteorologisches Observatorium, Potsdam.

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